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ABSTRACT

The purpose of the present report was to explore the effects of certain experimental variables on the development and integration of self-regulatory behaviors. A second purpose was to examine the relations between these behaviors and other non-test based sources of information on the child's behavior and environment during the preschool years. Finally, further evidence was sought as to the nature of developmental stability and change in self-regulation during this period. Four distinct series of analyses were undertaken. One considered the relation between preschool attendance and the levels and intercorrelations of self-regulatory behaviors. A second series focused on the relation between self-regulatory behaviors and information on the child's home environment; detailed information was collected from interviews with the children's mothers. In the third analysis, children's personal-social behaviors during free play in the preschool were examined for possible relations to self-regulatory behaviors. The final series provided another way of studying consistencies and discontinuities in children's performance on a certain measure over successive years of development. (Author/MS)

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DISADVANTAGED CHILDREN

AND THEIR FIRST SCHOOL EXPERIENCES

ETS-Head Start Longitudinal Study

Correlates and Implications of Self-Regulatory Behaviors

William C. Ward

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Chapter 1

Introduction

In an earlier report (Ward, 1973) it was found that a developmental change in self-regulatory behaviors occurs during the preschool years, with children moving toward the integration of these behaviors into a general dimension of self-regulatory ability. Correlational evidence, centered around Matching Familiar Figures (MFF) latencies and their relations with MFF errors, Motor Inhibition Test (MIT) slow performance, and ability and response tempo measures, provided no indication for such a dimension at the youngest age level studied, which was three years before the children were expected to enter first grade. In the following year some integration of these behaviors was seen, but only for girls and relatively high SES children--those who, on the basis of levels of test performance, appear to be more cognitively advanced at this age. In the year immediately preceding first grade entry, finally, a general self-regulatory dimension was seen in all the subgroups examined.

One purpose of the present report is to explore the effects of certain experiential variables on the development and integration of self-regulatory behaviors. A second is to examine the relations between these behaviors and other non-test based sources of information on the child's behavior and environment during the preschool years. Finally, further evidence will be sought as to the nature of developmental stability and change in self-regulation during this period. These efforts are to some extent related; for example, one source of evidence for developmental

change in the meaning of these behaviors would be the demonstration that their correlations with measures from other domains showed systematic differences over time.

Four distinct series of analyses were undertaken, differing both in the approach taken and in their relevance to the several concerns indicated above. The first considers the relation between preschool attendance and both the levels and the intercorrelations of self-regulatory behaviors. The approach is similar to that taken in the earlier report (Ward, 1973), with the substitution of Head Start attendance and economic eligibility as factors whose influence is examined.

The second series focuses on the relation between self-regulatory behaviors and information on the child's home environment. The previous report found a gross socioeconomic status index, mother's education, to be associated both with the level of some self-regulatory behaviors, and with the rate at which development of the self-regulatory dimension took place. The more detailed information available from interviews with the children's mothers is examined here in an attempt to discover which aspects of the family situation are associated with differences in self-regulation.

Third, the child's personal-social behaviors during free play in the preschool are examined for their possible relations to self-regulatory behaviors.

The final series provides another way of studying consistencies and discontinuities in MFF performance over successive years of development. It is addressed to the possibility that some regularities in performance can be found even where correlational evidence indicates that the majority

of subjects do not simply remain stable in their performance over time. These analyses involve dichotomizing the sample in each year on the basis of their latencies and error scores, in order to create the four cells of "reflective," "impulsive," "fast-accurate," and "slow-inaccurate," and then searching for contingencies in the tendency to move from one cell to another across years.

The sample on which all of these analyses are based is the group described in the earlier report. These were 895 children from Portland, Lee County, and Trenton who were given the battery of individual tests every year during the first three years of the study. (The reader is referred to Ward, 1973, for a detailed description of the sample and data collection procedures.) For some analyses, however, the effective sample was much smaller. In particular, the study of relations of personal-social behaviors to self-regulation involved a total N of 220, since the personal-social observations were obtained only for those children who were in preschool programs during the second year of data collection.

Subsequent chapters of this report will each be devoted to one of the four series of analyses described above. A final chapter will then provide a reconsideration of the development and implications of the self-regulatory behaviors.

Chapter 2

Preschool Attendance and Self-Regulation

A series of analyses was directed at discerning whether there are differences associated with preschool attendance in the levels or the intercorrelations of self-regulatory behaviors. Ideally, such analyses would provide information as to whether the child's preschool experience was responsible for acceleration of his development in this domain. Such acceleration might take the form either of increases in means, or of faster progression toward the integration of self-regulatory behaviors into a single dimension, as a result of preschool experience. This strong interpretation, however, requires that those whose preschool experience differed were not initially different with respect to these behaviors. If they should differ, with more advanced initial behavior found in those who attended preschool programs, the alternative explanation would be available that the groups under comparison were located on different growth curves and that their attendance was a correlate, not a cause, of their later performance differences.

Levels of Self-Regulatory Behaviors.

In order to dissociate initial level of performance from preschool attendance so far as is possible, analyses were done considering Head Start economic eligibility as well as preschool attendance. A series of repeated measures analyses of variance was performed, including as factors year of testing (Years 1-3, the repeated measure), eligibility or non-eligibility for Head Start, and preschool attendance (Head Start or No Known Attendance). These analyses were performed separately for each testing site to avoid

grouping in the same analysis children whose preschool year was the one immediately preceding first grade (Lee County) and those for whom it preceded first grade by two years (Trenton and Portland). Children whose eligibility for Head Start was indeterminate were excluded from consideration. Two categories of preschool attendance rather than three were employed, because, among children eligible to attend Head Start, there were almost none who attended other preschool programs; the presence of this nearly-empty cell in the design would at least have complicated interpretation of any significant effects obtained in the analysis.

An indication of the number of cases available for analysis is given in Table 1, which contains N's for the Matching Familiar Figures Test, separately by eligibility and attendance subgroups, for each year in each testing site. It should be noted that in each site between one-third and one-half of the study children who attended Head Start programs were ineligible to do so according to the OEO income guidelines then applicable.

Results are reported for analyses involving six scores. The four self-regulatory scores considered were MFF latencies, MFF errors, and MIT average practice and average "slow" performance. In addition, two cognitive measures from the battery, ETS Matched Pictures and ETS Enumeration, were included. These scores include all those available in every testing site over three years, from the larger matrix of self-regulatory and ability scores examined previously, except for the exclusion of MIT scores for individual trials. Analyses involving these latter scores were performed but, as in the earlier report, did not contribute systematic information not represented in the average scores.

Table 1

N's for Head Start Eligibility-Attendance Subgroups:
Matching Familiar Figures Test

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	52	32	27	39
	Year 2	57	38	27	42
	Year 3	57	37	27	42
Portland	Year 1	58	17	62	66
	Year 2	62	21	63	64
	Year 3	56	22	64	68
Lee County	Year 1	106	21	47	33
	Year 2	117	20	51	34
	Year 3	120	22	52	35

Tables 2 through 7 provide means for the several scores for each eligibility--attendance subgroup, in each site in each year. Summaries of probability values from the analyses of variance are presented in Tables 8-10. All the scores analyzed, with the exception of average practice times on the MIT, showed significant changes over repeated testing ($p < .001$) in each site. The linear component of the trend was significant (with one exception, $p. < .001$ or better) in each of these cases, while the quadratic trend, indicating unevenness of rate of change across years, was significant in a number of analyses without showing any apparent pattern. There was agreement as to the presence of a quadratic trend in only one analysis, that of Matched Pictures total score; changes in test items from one year to

Table 2

Mean Latency Scores for Head Start Eligibility-Attendance Subgroups: Matching Familiar Figures Test[1]

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	.54	.55	.54	.51
	Year 2	.60	.56	.59	.58
	Year 3	.56	.63	.56	.61
Portland	Year 1	.62	.69	.68	.67
	Year 2	.64	.62	.65	.63
	Year 3	.69	.73	.68	.73
Lee County	Year 1	.58	.60	.54	.57
	Year 2	.62	.58	.59	.65
	Year 3	.63	.64	.61	.63

[1]Latency scores are mean log (X + 1) based on the eight test items common to the test in every year.

Table 3

Mean Error Scores for Head Start Eligibility-Attendance Subgroups: Matching Familiar Figures Test[1]

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	.77	.80	.86	.67
	Year 2	.52	.67	.57	.48
	Year 3	.34	.40	.31	.25
Portland	Year 1	.76	.85	.71	.64
	Year 2	.54	.66	.44	.50
	Year 3	.31	.35	.29	.25
Lee County	Year 1	.74	.75	.75	.49
	Year 2	.73	.67	.61	.48
	Year 3	.43	.35	.37	.40

[1]Error scores are mean errors per item based on the eight test items common to the test in every year.

Table 4

Mean Scores for Head Start Eligibility-Attendance Subgroups: Motor Inhibition Test, Practice Trials [1]

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	47.64	47.94	48.88	49.61
	Year 2	48.66	46.84	48.84	48.14
	Year 3	49.97	49.05	50.20	52.45
Portland	Year 1	49.42	49.72	49.48	50.90
	Year 2	51.03	47.39	51.49	49.36
	Year 3	49.04	50.12	50.23	51.29
Lee County	Year 1	49.61	46.97	48.49	51.36
	Year 2	46.81	46.73	45.16	47.95
	Year 3	51.06	48.11	50.08	50.01

[1]The score is the mean of standardized log (X + 1) practice trial times in seconds, relative to a mean of 50 and SD of 10 for the total Year 1 sample.

Table 5

Mean Scores for Head Start Eligibility-Attendance Subgroups: Motor Inhibition Test, Slow Trials[1]

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	46.80	44.86	47.77	48.72
	Year 2	52.45	49.64	52.35	52.31
	Year 3	55.30	52.80	55.23	56.83
Portland	Year 1	49.68	48.91	50.84	51.67
	Year 2	55.15	53.04	55.50	54.96
	Year 3	56.25	57.80	58.96	59.28
Lee County	Year 1	46.98	47.22	47.82	52.42
	Year 2	50.60	52.88	50.78	56.19
	Year 3	58.53	57.65	59.16	61.61

[1]The score is the mean standardized log (X + 1) slow trial times in seconds, relative to a mean of 50 and SD of 10 for the total Year 1 sample.

Table 6

Mean Total Score (Nonadjusted) for Head Start Eligibility-Attendance Subgroups: ETS Matched Pictures Test

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	11.92	11.50	12.04	12.61
	Year 2	12.00	11.32	12.41	13.38
	Year 3	13.46	12.71	13.07	14.62
Portland	Year 1	12.00	13.95	13.11	13.05
	Year 2	13.00	13.10	12.80	13.04
	Year 3	13.56	13.45	14.16	14.19
Lee County	Year 1	12.01	12.10	12.92	13.73
	Year 2	9.55	10.43	9.94	12.47
	Year 3	12.85	12.18	13.65	15.00

Table 7

Mean Total Score for Head Start Eligibility-Attendance Subgroups: ETS Enumeration Test

		Eligible		Ineligible	
		Head Start	None	Head Start	None
Trenton	Year 1	4.92	5.31	5.38	6.74
	Year 2	12.93	11.40	12.46	12.28
	Year 3	17.68	15.29	16.64	17.67
Portland	Year 1	5.85	5.10	6.79	6.28
	Year 2	13.30	9.63	13.68	13.38
	Year 3	19.00	16.55	18.60	19.54
Lee County	Year 1	4.20	5.50	5.07	5.72
	Year 2	9.63	10.70	11.98	12.79
	Year 3	15.19	15.55	17.18	16.58

Table 8

Summary of Probability Levels for Head Start Eligibility-Attendance Analyses of Variance: Trenton

	Across Years			Linear Effects				Quadratic Effects			
	Eligibility (A)	Attendance (B)	AxB	Year (C)	AxC	BxC	AxBxC	C	AxC	BxC	AxBx
Score											
MFF RT				.0001		.05				.05	
MFF error			.01	.0001							
MIT Practice	.05			.01							
MIT slow	.05			.0001							
Matched Pictures	.01		.01	.0001				.05			
Enumeration				.0001		.05		.01			

Table 9

Summary of Probability Levels for Head Start Eligibility-Attendance Analyses of Variance: Portland

	Across Years			Linear Effects				Quadratic Effects			
	Eligibility (A)	Attendance (B)	AxB	Year (C)	AxC	BxC	AxBxC	C	AxC	BxC	AxBxC
Score											
MFF RT				.01				.0001		.05	
MFF error	.05			.0001						.01	
MIT Practice										.01	
MIT slow				.0001							
Matched Pictures				.0001			.05	.05			
Enumeration				.0001							

Table 10

Summary of Probability Levels for Head Start Eligibility-Attendance Analyses of Variance: Lee County

	Across Years			Linear Effects				Quadratic Effects			
	Eligibility (A)	Attendance (B)	AxB	Year (C)	AxC	BxC	AxBxC	C	AxC	BxC	AxBxC
Score											
MFF RT			.05	.0001							.05
MFF error	.05	.05		.0001			.01	.001	.05		
MIT Practice			.01					.0001			
MIT slow		.05		.0001				.01			
Matched Pictures	.001	.05	.05	.001				.0001		.01	
Enumeration	.001			.0001					.05		

the next prevent an interpretation of this interaction in terms of differential growth rate. For Trenton and Portland, in which Year 2 was the Head Start year, there were no significant quadratic trends, with one exception: in the Portland MFF latency data, a slight decline in mean latency was observed from Years 1 to 2, followed by an increase in Year 3. This pattern was not repeated in the other groups. In general, mean changes over years gave no indication that the Portland and Trenton samples were any more similar to one another than they were to the Lee County group.

In the Portland and Trenton samples there were no main effects for preschool attendance, while in Lee County there was a marginal effect ($p < .05$) for MFF errors, MIT slow performance, and Matched Pictures total score. Those in Lee County who did not attend Head Start had higher levels of performance than those who did, indicating, in the absence of a year by attendance interaction, a pre-existing difference in level of performance between those who chose to attend Head Start and those who did not, rather than an effect attributable to preschool attendance. The only such interaction which was significant in both the Trenton and Portland samples was the quadratic year by attendance interaction for MFF latencies, which was of marginal significance in each sample ($p < .05$). Those who did not attend Head Start had longer latencies in Year 3 than those who did attend, while in Years 1 and 2 they tended, with less than perfect consistency among subgroups, to have shorter latencies.

These inconsistent relationships should not obscure the major point to emerge from these analyses: that there is no simple or unambiguous effect on levels of self-regulatory performance associated with whether or not the child attended Head Start.

It is also worthy of note that economic eligibility for Head Start is a weaker basis for prediction of individual differences in test performance than is mother's educational level, which was employed in the earlier self-regulatory report (Ward, 1973). In the earlier analyses, MFF errors and MIT slow performance, along with the general cognitive ability measures included in the battery, showed large differences associated with maternal education; while here the effects of eligibility were more often of marginal significance, or made their appearance in the form of scattered interactions rather than simple main effects when they appeared at all.

Finally, so far as mean levels of performance are concerned, it appears that using eligibility as a basis for controlling socioeconomic status differences among groups differing in preschool attendance failed to eliminate these differences for the Lee County sample. The several (weak) effects associated with preschool attendance indicate that those who attended Head Start performed at a lower level in all three years on several measures associated with general competence, suggesting that irrespective of eligibility these were a more socioeconomically disadvantaged subgroup than those who did not attend.

Intercorrelations among Self-Regulatory Behaviors.

Two series of correlational analyses were run. One of these involved the combined samples from Trenton and Portland, while the other was limited to Lee County. This combination was made in order to increase the number of cases represented in the coefficients without grouping together children whose Head Start experience came in different years. Four matrices were obtained for the Trenton-Portland grouping: the four possible combinations

of eligibility or ineligibility for Head Start, by Attended Head Start or No Known Preschool Attendance. (Even after combining the data from two sites, N's were insufficient to support analyses for children attending other preschool programs.) For the Lee County sample, three matrices were obtained: those eligible for Head Start and attending Head Start, those ineligible but attending Head Start, and those ineligible and attending other preschool programs. Approximate N's for most of these analyses are given in Table 1; the Lee County Ineligible-Attended Other Preschool group had N's of 96-98 for the three years.

Tables 11-13 present data on the year-to-year stability of the four self-regulatory and two ability scores which were considered in the analysis of levels of performance. Stability coefficients are also included for two response tempo measures, the response times from the Sigel Object Categorizing Test and the Preschool Embedded Figures Test (PEFT). In Table 11 are presented the correlations for the four subgroups from the combined Trenton-Portland samples. Table 12 contains similar information for the three subgroups in the Lee County analyses. Table 13 provides a summary of the data from the first two tables--each entry in Table 13 is the median correlation over the subgroups for whom analyses were obtained in Table 11 or Table 12. For comparative convenience, the corresponding stability coefficients obtained from the full three-year three-site analyses reported in Ward (1973) are also provided.

The results summarized in Table 13 indicate that there is no notable difference in the overall stability of any of the measures examined between either the Trenton-Portland or the Lee County sample employed here and the full sample examined in earlier analyses. Nor, from an examination of Tables 11 and 12, is there evidence for systematic differences among the various eligibility-attendance subgroups. Several post-hoc comparisons

Table 11

Stability of Scores over Years

Trenton--Portland Sample

Subgroup Years	Elig. Att. 1x2	1x3	2x3	Inelig. Att. H.S. 1x2	1x3	2x3	Elig. No Known Att. 1x2	1x3	2x3	Inelig. No Known Att. 1x2	1x3	2x3
Score												
MFF RT	.25	.20	.23	.18	.30*	.26	.18	.46*	.24	.26*	.25	.29*
errors	.23	.27*	.42**	.48**	.33*	.42**	.59**	.40*	.22	.48**	.35**	.35**
MIT practice	.04	-.01	.02	.24	-.07	.07	.04	.05	.07	.23	-.08	.03
slow	.42**	.18	.19	.35*	.38**	.24	.15	.21	.20	.42**	.16	.14
Matched Pictures	.27*	.19	.32**	.43**	.44**	.57**	.09	.17	.40*	.46**	.35**	.58**
Enumeration	.34**	.26**	.50**	.42**	.35*	.45**	.35	.36	.55**	.29*	.33*	.45**
Sigel RT	.01	-.06	.31*	-.03	.13	.02	-.12	.21	.20	.06	.13	.09
PEFT RT	.10	.16	.29*	.18	.10	.35*	.20	-.17	.11	.29*	.35**	.19

* $p < .01$ ** $p < .001$

Table 12

Stability of Scores over Years

Lee County Sample

Subgroup Years	Elig. Att. 1x2	 1x3	 2x3	Inelig. Att. 1x2	 1x3	 2x3	Inelig. Other P.S. 1x2	 1x3	 2x3
Score									
MFF RT	.17	-.02	.15	.19	.05	.29	.17	.20	.22
errors	.45**	.30*	.38**	.30	.29	.46*	.53**	.48**	.44**
MIT practice	.14	-.02	.20	.16	-.08	-.13	.16	.08	.10
slow	.39**	.14	.35**	.21	.37*	.14	.56**	.29*	.40**
Matched Pictures	.28*	.25*	.39**	.44*	.28	.37*	.44**	.51**	.62**
Enumeration	.42**	.31*	.49**	.39	.34	.41*	.55**	.39**	.52**
Sigel RT	--	.22	--	--	.30	--	--	.20	--
PEFT RT	--	.07	--	--	-.02	--	--	.20	--

* $p < .01$ ** $p < .001$

Table 13

Stability of Scores over Years

Comparison of Samples

Sample / Year	Medians for 4 Trenton-Portland Subgroups 1x2	1x3	2x3	Medians for 3 Lee County Subgroups 1x2	1x3	2x3	Three-year Three-site Total 1x2	1x3	2x3
Score									
MFF RT	.22	.28	.25	.17	.05	.22	.16	.18	.19
errors	.48	.34	.39	.45	.30	.44	.48	.38	.47
MIT practice	.14	-.04	.05	.16	-.02	.10	.13	-.01	.07
slow	.39	.20	.20	.39	.29	.35	.42	.27	.32
Matched Pictures	.35	.27	.49	.44	.28	.39	.37	.39	.52
Enumeration	.35	.34	.48	.42	.34	.49	.41	.36	.55
Sigel RT	-.01	.13	.15	--	.22	--	-.03	.11	.17
PEFT RT	.19	.13	.24	--	.07	--	.19	.14	.20

could be made to yield statistical significance; but such differences as are found are weak, inconsistent over time, or limited to one of several measures which were expected to behave similarly.

Turning to the integration of self-regulatory scores within years, the first question is that of the degree to which MFF latencies and errors are related. Table 14 presents this information for each of the three years, for the four Trenton-Portland and three Lee County subgroups. Results for the full three-year three-site sample are included for comparative purposes. Data from Years 1 and 3 present the picture expected from the analyses in the earlier report; in no subgroup was there a substantial negative correlation between latencies and errors in Year 1, and most of the coefficients were low and positive. In Year 3, on the other hand, all subgroups showed a negative relation between these two scores. The coefficients are significant at the .001 level in five of the seven groups. In Trenton-Portland the correlation is not significant for children in the Eligible-No Known Attendance subgroup ($p < .07$); and in Lee County it is nonsignificant for those in the Ineligible but Attended Head Start subgroup. In neither case, however, do these coefficients differ significantly from any of the remaining correlations obtained within the site.

The Year 2 data, however, do present several contrasts. First, in Year 2 none of the Lee County subgroups had a significant latency-error relation, while three of the four Trenton-Portland subgroups had a relation significant at .002 or better. The difference across sites is highly significant. For example, when the median within-site correlations are compared, $r = -.33$ for Trenton-Portland and $-.02$ for Lee County; $p < .0001$. This difference suggests a slower rate of development toward integration of self-regulatory behaviors in the Lee County sample as a whole.

Table 14

MFF Latency-Error Correlations
by Year and Subgroup

Group	Year 1	Year 2	Year 3
Trenton-Portland			
Elig.-Att. H.S.	-.09	-.29*	-.33**
Inelig.-Att. H.S.	.15	-.50**	-.42**
Elig.-No Known Att.	.06	-.02	-.24
Inelig.-No Known Att.	-.03	-.38**	-.34**
Lee County			
Elig.-Att. H.S.	.16	.03	-.40**
Inelig.-Att. H.S.	.22	-.02	-.13
Inelig.-Att. Other P.S.	.01	-.04	-.37**
Three-year Three-site Total	.06	-.10	-.36**

* $p < .01$ ** $p < .001$

Second, there is an apparent difference within the Trenton-Portland group associated with both eligibility and attendance. The largest coefficient was that for children who were ineligible and who attended Head Start ($r = -.50$, $p < .001$). Those who were eligible and attended, and those who were ineligible and did not attend any preschool program, had somewhat lower, but still significant correlations ($r = .29$, $p < .002$ and $r = -.38$, $p < .001$, respectively); while those who were eligible for Head Start but did not attend had the lowest correlation ($r = -.20$, n.s.). It is tempting to interpret this ordering of coefficients as suggesting that both higher socioeconomic status, as indicated by Head Start ineligibility, and Head Start attendance, were associated with a faster rate of progression in the integration of self-regulatory behaviors. However, tests of the significance of the difference among these coefficients showed

that only the extreme contrast between those who were ineligible but attended and those who were eligible but did not attend Head Start reached an acceptable level of significance ($p < .01$). There was not a significant difference between those who attended and those who did not, either for the subgroups eligible to attend Head Start or for the groups that were ineligible.

In the earlier report (Ward, 1973) evidence for changes in the meaning of self-regulatory behaviors involved, in addition to the MFF latency-error analyses, analyses of the relation of MFF latency to Motor Inhibition Slow scores and to indices of general ability. Tables 15 and 16 present the correlational results relevant to these comparisons. With respect to MIT slow scores (Table 15) the earlier analyses found no relation to latencies in the first two years for the group as a whole, but a low positive relation in Year 3. Similar results were obtained for the present subsamples. Only one coefficient of fourteen was significant in the first two years, and in no case did the within-site subgroup comparisons reach significance at .01. Six of seven coefficients were significant at .01 or better in Year 3, and again no significant differences among coefficients within sites were found. Thus, no eligibility or attendance effects were found for the relation of MFF latencies to MIT slow performance.

With respect to general ability (Table 16) the earlier analyses found that MFF latencies followed the same pattern as did MIT slow scores--low and nonsignificant relations in Year 1 and 2, a moderate positive relation in Year 3. The present data showed no significant relations in the first two years, while in Year 3, two of the seven coefficients were significant at .01--those for Trenton-Portland children who attended Head Start, whether or not their families met Head Start economic eligibility criteria. Once

Table 15

MFF Latency-MIT Slow Correlations
by Year and Subgroup

Group	Year 1	Year 2	Year 3
Trenton-Portland			
Elig.-Att. H.S.	.03	.03	.25*
Inelig.-Att. H.S.	.20	.13	.30*
Elig.-No Known Att.	.30	.05	.49**
Inelig.-No Known Att.	.13	.29*	.36**
Lee County			
Elig.-Att. H.S.	-.14	.09	.43**
Inelig.-Att. H.S.	-.12	.05	.14
Inelig.-Att. Other P.S.	.13	-.07	.26*
Three-year Three-site Total	.04	.07	.32**

* $p < .01$ ** $p < .001$

Table 16

MFF Latency-Matched Pictures Correlations
by Year and Subgroup

Group	Year 1	Year 2	Year 3
Trenton-Portland			
Elig.-Att. H.S.	-.13	.12	.31*
Inelig.-Att. H.S.	.12	.11	.29*
Elig.-No Known Att.	.23	.20	.08
Inelig.-No Known Att.	-.14	.09	.11
Lee County			
Elig.-Att. H.S.	.08	-.05	.22
Inelig.-Att. H.S.	-.09	-.03	.11
Inelig.-Att. Other P.S.	-.13	-.16	.02
Three-year Three-site Total	-.02	-.02	.21**

* $p < .01$ ** $p < .001$

more, however, there were no significant differences among the coefficients within site and year, preventing any conclusion that either eligibility for, or attendance of, Head Start affected the rate of integration of self-regulatory behaviors.

Two further series of correlational analyses were performed to complete the comparison of preschool attendance subgroup results with those given in the earlier report. The first of these involved examination of partial correlations between MFF latency and error scores, and between MFF latency and MIT slow scores. In each case a general ability index was partialled out. The intent was to discover whether such relations as were found among the self-regulatory behaviors involved variance specific to this domain, or whether the general ability component of the various scores was sufficient to account for their relations. In the present analyses the ETS Matched Pictures total score was the ability measure partialled out of the coefficients; the Preschool Inventory, which was used in the earlier report, was not available for the Trenton-Portland sample in Year 3. Matched Pictures had median correlations with the Preschool Inventory of .36 in Year 1, .53 in Year 2, and .50 in Year 3, and appears to be an adequate substitute for the present correlational purposes.

Table 17 presents the partial correlations, which are virtually identical to the zero-order correlations presented in Tables 14 and 15. To the extent that the Matched Pictures Test gives an adequate representation of general ability, the associations found between MFF latencies and the other self-regulatory scores involve variance specific to the self-regulatory domain, rather than variance attributable to general ability.

Table 17

Partial Correlations Among Self-Regulatory Scores

Group	MFF RT x Error			MFF RT x MIT Slow		
	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Trenton-Portland						
Elig.-Att. H.S.	-.11	-.27*	-.25*	.06	.01	.21
Inelig.-Att. H.S.	.22	-.50**	-.35**	.17	.10	.25
Elig.-No Known Att.	.12	.07	-.23	.30	.01	.49**
Inelig.-No Known Att.	-.06	-.38**	-.33**	.14	.28*	.35**
Lee County						
Elig.-Att. H.S.	.17	.01	-.36**	-.18	.11	.41**
Inelig.-Att.	.21	-.04	-.10	-.10	.06	.12
Inelig.-Att. Other P.S.	-.01	-.11	-.39**	.14	-.03	.26*
Three-year Three-site Total	.06	-.13**	-.31**	.05	.08	.28**

* $p < .01$ ** $p < .001$

Finally, analyses of the relations of self-regulatory scores to two response tempo scores, the Sigel and PEFT response times, were performed. The earlier report found that only MFF latencies had an appreciable relation with response tempo in any year; thus, the present analysis was limited to examination of relations between MFF latencies and the two tempo measures for each subgroup in each year. Table 18 presents the coefficients from this analysis. As in the total three-year three-site sample, all groups for whom the coefficients were available showed a pattern of moderately strong correlations between Sigel and MFF latencies in Year 1, very low correlations in Year 2, and moderate correlations in Year 3; the coefficients were of the same order of magnitude as in the total sample, and there were no significant subgroup differences within the series of analyses for any site and year. Also as before, PEFT latencies showed a similar pattern of results but lower coefficients. Here again, there was no evidence for

Table 18

Correlations of Response Tempo Scores
With MFF Latencies by Year and Subgroup

Group	Year 1		Year 2		Year 3	
	Sigel RT	PEFT RT	Sigel RT	PEFT RT	Sigel RT	PEFT RT
Trenton-Portland						
Elig.-Att. H.S.	.48**	.17	.06	.15	.24*	.17
Inelig.-Att. H.S.	.45**	.11	.16	.08	.25	.22
Elig.-No Known Att.	.62**	.15	-.09	.08	.52**	.29
Inelig.-No Known Att.	.61**	.27*	.11	.04	.47**	.44**
Lee County						
Elig.-Att. H.S.	.46**	.14	--	--	.20	.12
Inelig.-Att. H.S.	.34	.26	--	--	.12	.26
Inelig.-Att. Other P.S.	.47**	.16	--	--	.33*	.08
Three-year Three-site Total	.46**	.18**	.07	.10	.29**	.18**

* $p < .01$ ** $p < .001$

differences in the meaning of the self-regulatory measure associated with differential patterns of preschool attendance.

In summary, correlations among these behaviors gave no indication that the child's preschool attendance affects the rate at which he progresses toward integration of self-regulation into a single dimension. There was some indication of a site difference, with Lee County children progressing more slowly than those in Trenton and Portland, but this effect did not interact with preschool attendance. Within the Trenton-Portland sample, there was a suggestion of an interaction in developmental rate in the Year 2 latency-error correlations, but the differences between those who did and did not attend Head Start, controlled for economic eligibility, failed to reach statistical significance.

To the extent that our sample received representative Head Start experience, the conclusion must be drawn that Head Start attendance does not result in changes in the young disadvantaged child's development in the several aspects of self-regulatory performance which were examined. These results do not justify a more general conclusion that Head Start is ineffective in altering behavior in general or that all Head Start experience is irrelevant to self-regulatory behaviors in particular. Among the possibilities than cannot be discounted at this point in time are the following: (a) Effects on self-regulation may make an appearance at a later point in time. (b) Some Head Start experiences may be effective, while others are not. (c) Head Start experiences (or some of them) may be effective for some children but not for others. A multitude of possible interactions need to be considered to exhaust possibilities of this form; for example, degree of structure provided by the preschool program could interact with the child's disposition to give sustained attention to a task, with positive effects on self-regulation only for certain combinations of such variables (and, possibly, with negative effects following from others). Further analyses of these types will be necessary to permit a general conclusion as to the modifiability of self-regulation by preschool experience.

From another perspective, these results give evidence for great robustness in the findings as to developmental change in self-regulation which were reported in Ward (1973). In the present analyses, correlations were examined for subsamples selected as to site, preschool attendance, and socioeconomic level; neither the elimination of possibly confounding effects on results through the selection of relatively homogeneous subgroups, nor the examination of results based on relatively small subsamples from the

target population, necessitated any qualifications as to the form or generality of the transition which was discussed in the earlier report.

Chapter 3

Home Environment and Self-Regulation

Analyses in this chapter are directed at the relation of home environmental variables to self-regulatory behaviors. Home variables were obtained from an interview which was given in the first year of data collection, several months before any individual testing took place. The interview was repeated in Trenton and Portland in the second year with only slight modifications. It took about 90 minutes to administer and covered a broad range of topics, including both process variables such as mother's discipline techniques and her aspirations for the child's education, and status variables such as the physical resources available in the home and parental educational levels.

A report by Shipman (1972a), which also contains information on data collection procedures and a copy of the interview form, provided the basis for the reduction of the large number of interview items to a manageable number of scores. Shipman found, through factor analysis of Year 1 interview data, eight major clusters of items and derived scores. In the present analysis an intermediate position was taken with respect to the specificity/generality of the scores employed. The set of items and scores was reduced to 23 from the 57 which had been entered into the factor analysis, through the elimination of some items which did not seem relevant, and by combining items which were logically and empirically related to one another. Seven scores not employed in the factor analysis were added. The groupings of items were all consistent with the factor analytic results; that is, no combinations were made which were not defensible in terms of similar factor loadings for these items. The use of 23 variables from the factor analysis,

rather than of eight factor scores, was intended to facilitate understanding by requiring less interpretation in the labeling of these scores, and thereby making inference more direct to the process by which each influence might operate. The 30 scores are listed in Table 19, which includes a brief description of each along with the identifier which was used for it in Shipman's (1972a) presentation of results.

Six self-regulatory scores were employed. Three of these are straightforward--MFF latencies, MFF errors, and MIT slow performance. Three derived scores were also employed in order to allow an examination of possible interactions as well as main effects of self-regulatory scores. The first of these, Latency X Error, is the cross-product of latency and error scores (after reflection of the error scores to create an MFF "accuracy" score), with latency and accuracy scores both regressed out. This score is analogous to the interaction term in the analysis of variance which could be performed using as design factors MFF latencies (children high vs. those low) and MFF errors (again, those high vs. those low). Its purpose is the same, to allow an assessment of whether latencies and errors taken together provide any greater predictability of a given dependent variable than is provided by the addition of the latency effect and the error effect.[1] Presence of a significant interaction term would indicate that the stylistic variable conceptualized by these two scores is meaningfully associated with other behaviors or influences in the child's life. Absence of interactions, in the face of simple effects for latencies and errors, would instead suggest that two independent sources of influence are operating (or conversely, that

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[1] Unlike the analysis of variance, this analysis preserves the information in continuous form. It thereby avoids the loss of statistical power which results from the dichotomization of continuous information.

Table 19

Maternal Interview Score Descriptions

Item or Group	Description	Coding
SDK	Sum of don't knows	Sum of questions coded vague or "don't know."
25-30	Mean age child can do for self--independence	Mean age.
31-35	Mean age child can do for self--knowledge	Mean age.
44	Aspiration for child's education	Coded 0-20 for number of years of schooling completed; graduate or professional = 20.
45	Expectation for child's education	Same as Item 44.
106-107	Control over community	0 = "no" to both Q.; 1 = "yes" to one; 2 = "yes" to both.
Group 3	Attitude toward school	Sum of positive responses to Q. 53-55, 57, 59, 62, 63, 65, 66.
119-124	Group memberships	Sum of group memberships across categories.
199-204	Child's possessions	Sum of Q. coded; 1 = "yes."
Group 10	Possessions in the home	Sum of Q. 208-214 and Q. 43; 1 = "yes."
293-295	Cooperativeness	Sum of ratings 3-15; reverse direction.
195	Number rooms/number people	Derived score: # rooms in relation to # in household.
Group 13	Adequacy of home from interviewer ratings	Sum of responses to Q. 283, 284, 286, 287, 306, 307.
183	Number of times moved	Actual number reported, except 8 = 8 or more.
AA	Adult/child ratio	# adults/children (adult = over 18)
MATN	Mother negative attitudes toward child	Sum of Q. 9, 11, 12, 14, 16.
6	Mother-child home interaction	1 = sleeping; explicit absenting of self from child; housework/preparing meals; watching children; watching TV; 2 = direct household interaction; direct interaction outside home.
17-18	Child adjustment to school	Mean of Q. 17 and 18.

Table 19 (continued)

Maternal Interview Score Descriptions

Item or Group	Description	Coding
51-52	Mother's articulation	Number of categories used in response to open-ended Q. to describe "good" students and teachers.
38,41	Frequency read to child (mother and others)	Mean of Q. 38 and 41.
60,70	Control over school	Sum of Q. 60 and 70; 1 = "yes."
111,118	Attitude toward neighborhood	Q. 111 minus Q. 188.
49A	Physical vs. verbal punishment (serious infraction)	1 = a) severe physical, b) punish, unspecified, c) mild physical; 2 = d) severe verbal, e) mild verbal.
49B	Severe vs. mild punishment (serious infraction)	1 = a & d (as in 49A); 2 = c & e (as in 49A), revoke privileges, distraction-substitution, ignore--do nothing.
50A	Physical vs. verbal punishment (minor infraction)	Same coding as in 49A.
50B	Severe vs. mild punishment (minor infraction)	Same coding as in 49B.
C.POS.A	Child ordinal position in family	1 = oldest, 2 = middle, 3 = youngest
C.POS.B	Child ordinal position in family	1 = only, 2 = not only
45/44	Deviation of aspiration from expectation (child education)	Based on regression of 45 on 44; $Y = 4.99 + .53X$.
Group 12 D	Mother involves child outside home	Sum of Q. 132, 221, 226-228, 243-245, 260-262.

factors affecting latencies and errors may operate separately on these two as independent aspects of the child's test performance). A distinction of this type is implied in earlier work by Gardner and his colleagues (e.g., Gardner, Holtzman, Klein, Linton and Spence, 1959), in their discussion of cognitive controls and cognitive styles. Their work, however, was only illustrative of the problem; this more stringent requirement for the identification of a stylistic affect has not generally been employed in practice.

The other two derived scores were obtained in a similar manner. Latency X Slow is the cross-product of MFF latencies and MIT slow scores, with latencies and slow scores regressed out. A high score implies that the individual is consistently slow in his responses to the two tasks, a low score implies fast responses in both, and an intermediate score indicates inconsistency. Finally, Latency Squared is the square of the individual's MFF latency, with MFF latency regressed out. It provides the opportunity to discover whether there are significant curvilinear (quadratic) relationships between latency and the interview variables. Inclusion of this score was suggested by some of Emmerich's findings, particularly those involving the Enhancement of Learning Inventory (Emmerich, 1973b), of curvilinear relations between latency scores and child performance.

Three sets of analyses were performed. The first examined the relations between the self-regulatory scores from the testing in Year 3 and the Year 1 interview data, for the group consisting of all subjects from the three-year three-site longitudinal sample on which this information was available. Year 3 self-regulatory behaviors were employed since it was only in this year that the meaning of those scores could be unambiguously assumed, at least for the entire sample, to be that

which has been imputed to these scores in the bulk of the literature. A second set examined relations between Year 1 interview and Year 1 self-regulatory scores. This analysis afforded a concurrent examination of home variables and self-regulatory behaviors. Any effects of home environment might be strongest when no intervening time period introduces the possibility of extraneous influences to weaken the relationships which might otherwise be found. Finally, Year 2 interview and Year 2 self-regulatory behaviors were examined jointly. In these analyses the correlations were obtained for sex and SES subgroups as well as for the total longitudinal sample. For at least some of the subjects--e.g., females and higher SES children--the earlier report suggested that the more mature form of self-regulatory behavior had already appeared, so that there were several subgroups for whom concurrent relations with the self-regulatory dimension could be examined. Year 2 interviews, however, were available only for Trenton and Portland children, and not all of the scores listed in Table 19 could conveniently be obtained from the data in their present form. In addition, structural analyses of Year 2 interview data have not been completed, making it necessary to assume structural similarity across years in combining items into scores.

Relationship of Year 3 Self-Regulatory Behaviors to Year 1 Interview Variables

The first set of analyses involved the relations of the six Year 3 self-regulatory scores to the 30 Year 1 interview scores listed in Table 19. Table 20 provides the matrix of correlations between these two sets of scores. Some comments about the table as a whole are appropriate. First, none of the interaction variables had an appreciable number of significant relations with the interview variables. Latency X Error had no relations to interview variables significant at the .01 level, and no coefficient larger than $\pm$.08. Latency

Table 20

Zero-order Correlations Between Year 3 Self-Regulatory Scores and Year 1 Interview Variables

Interview Variables	N	Self-Regulatory Score: MFF Latency	MFF Errors	MIT Slow	Latency X Errors	Latency X Slow	Latency Squared
SDK	840.	.03	.00	-.05	.04	.02	.05
25-30	837.	-.04	.08	.00	.05	-.01	.00
31-35	839.	-.09	.24*	-.06	.02	-.02	.01
ITEM 44	833.	.09	-.26*	.12*	-.03	.05	-.03
ITEM 45	748.	.11*	-.30*	.15*	.01	-.02	-.01
106-7	840.	-.02	-.04	.05	-.05	.05	-.03
GROUP 3	840.	-.13*	.06	.02	-.03	-.03	-.07
119-124	840.	.01	-.20*	.15*	.01	.00	-.05
199-204	840.	.10*	-.16*	.08	-.08	-.01	.02
GROUP 10	840.	.16*	-.29*	.09*	-.05	.06	.03
293-295	827.	.06	-.06	.02	.05	.02	.04
ITEM 195	833.	.07	-.22*	.05	.00	.03	.04
GROUP 13	840.	-.05	.12*	-.06	.00	.00	.04
ITEM 183	816.	.03	.04	.00	-.05	.01	-.01
AA	840.	.04	.00	.06	-.04	.02	.04
MATN	840.	.06	-.09*	.05	-.08	-.12*	-.11*
ITEM 6	805.	.02	.01	.03	-.01	-.01	-.02
17-18	790.	-.06	.18*	-.06	.05	.02	.08
51-52	840.	.13*	-.13*	.13*	.02	.05	.00
38,41	805.	.07	-.15*	.07	.00	.00	.00
60,70	840.	.07	-.11*	.08	.02	-.01	-.06
111,188	824.	.02	-.03	.06	.05	.02	.01
ITEM 49A	817.	-.01	-.02	.02	.02	-.02	.00
ITEM 49B	263.	-.04	.09	-.06	.07	.05	.09
ITEM 50A	792.	.08	-.07	.14*	.00	.04	-.08
ITEM 50B	731.	.05	-.02	.02	.04	.04	.00
C.POS A	754.	-.05	-.03	.06	-.03	.02	-.02
C.POS B	840.	-.04	-.03	-.06	.01	-.01	-.03
45/44	745.	.09	-.20*	.10*	.04	-.06	-.01
GROUP 12D	839.	.08	-.08	.00	-.05	-.05	.00

* $p < .01$

X Slow and Latency Squared each had only one significant relation (r = -.12 and -.11, respectively). The small number of significant coefficients, combined with their low magnitude, raises the strong possibility that these are chance occurrences. It would be necessary to show consistency of the coefficients over the several subgroups to be examined below to have any confidence that they represent "real" relations. With these few possible exceptions, then, it can be concluded that no interactive effects involving the self-regulatory variables were found between Year 1 interview and Year 3 self-regulation scores.

For the three simple self-regulatory scores, the picture is somewhat more positive. MFF errors were significantly related to 14 of the 30 interview variables included in the analysis. MFF latencies had significant relations to five of the 30, and MIT slow scores, to seven of the 30. It appears, also, that the same interview variables tend to show significant relations across the three self-regulatory scores--i.e., considering the five significant correlations involving MFF latencies, four of the variables involved also had significant correlations with MFF errors; considering the seven significant correlations involving MIT slow scores, six of these variables had significant correlations with MFF errors. This pattern, along with the lack of significant interactions of self-regulatory measures in predicting to the interview scores, suggests that, while MFF errors are a better predictor of interview variables, it is common variance in the self-regulatory scores, rather than variance unique to any of them, that is responsible for the significant relations which were obtained.

Previous analyses showed clearly that the relations of self-regulatory scores to indices of general ability followed just this pattern--MFF errors

were strongly related to general ability, while Year 3 MFF latencies and MIT slow scores had lower relations with ability indices. The question then arises, whether the relations which are found between self-regulation and interview scores involve variance that is unique to the self-regulatory domain, or whether it is more parsimonious to attribute these relations to the broader ability domain. To answer this question, the correlations between self-regulation and interview scores, with Preschool Inventory scores partialled out, were obtained.[1] The matrix is shown in Table 21. Only three coefficients relating the derived self-regulatory scores to interview variables were significant; and 9 rather than 28 coefficients involving simple self-regulatory scores reached significance. There are no coefficients in the table larger than $\pm$.13. It appears that the bulk of the relations found between interview and self-regulatory scores follow from variance which both sets of variables share with general ability measures, rather than from any association which is specific to self-regulation.

A second demonstration of this association is given by observing that in Table 20 there was only one significant correlation (r = -.13 between MFF Latency and "Group 3") between a self-regulatory score and an interview variable which did not correlate significantly with the Preschool Inventory.

Thus, where a general ability index correlates significantly with interview scores, there is a tendency for self-regulatory scores, especially MFF Errors, to correlate also, but with coefficients of a lower magnitude; where this general ability index does not correlate significantly with in-

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[1] The Preschool Inventory was given in all sites in both Years 1 and 2. For convenience, the Year 2 score was used to represent general ability in all partial correlation analyses. Since the stability of the score was high (Year 1-2 correlation = .75), the choice is unlikely to have a material effect on the coefficients.

Table 21

Partial Correlations Between Year 3 Self-Regulatory Scores and Year 1 Interview Variables

Interview Variables	N	Self-Regulatory Score: MFF Latency	MFF Errors	MIT Slow	Latency X Errors	Latency X Slow	Latency Squared
SDK	840.	.04	-.04	-.04	.04	.02	.05
25-30	837.	-.01	-.01	.05	.04	-.01	.00
31-35	839.	-.01	.03	.06	.01	-.02	.02
ITEM 44	833.	.02	-.08	.02	-.02	.04	-.04
ITEM 45	748.	.04	-.10*	.04	.03	-.03	-.03
106-7	840.	-.03	-.01	.03	-.05	.05	-.03
GROUP 3	840.	-.12*	.02	.04	-.03	-.03	-.07
119-124	840.	-.03	-.10*	.09*	.02	-.01	-.06
199-204	840.	.03	.03	-.02	-.08	-.02	.01
GROUP 10	840.	.10*	-.10*	-.02	-.04	.06	.01
293-295	827.	.04	.00	-.01	.05	.02	.04
ITEM 195	833.	-.01	.00	-.07	.01	.03	.02
GROUP 13	840.	-.02	.03	-.02	.00	.00	.05
ITEM 183	816.	.03	.05	.00	-.05	.01	-.01
AA	840.	.02	.08	.03	-.04	.01	.04
MATN	840.	.03	-.01	.00	-.08	-.13*	-.12*
ITEM 6	805.	.01	.05	.01	-.01	-.01	-.02
17-18	790.	-.02	.10*	-.01	.04	.03	.09*
51-52	840.	.09*	-.02	.08	.02	.04	.00
38,41	805.	.03	-.05	.02	.01	-.01	-.01
60,70	840.	.04	-.02	.03	.03	-.02	-.06
111,188	824.	.01	.00	.05	.05	.02	.00
ITEM 49A	817.	-.02	.02	.00	.02	-.02	.00
ITEM 49B	263.	-.02	.03	-.02	.06	.05	.10
ITEM 50A	792.	.05	-.01	.11*	.01	.04	-.09
ITEM 50B	731.	.05	-.01	.02	.04	.04	.00
C.POS A	754.	-.06	.01	.04	-.03	.01	-.02
C.POS B	840.	-.03	-.06	-.05	.01	-.01	-.03
45/44	745.	.04	-.07	.03	.05	-.07	-.02
GROUP 12D	839.	.08	-.07	-.02	-.05	-.05	.00

* $p < .01$

terview scores, there is approximately a chance rate of occurrence of significant self-regulatory--interview correlations (1 in 66). This pattern does not lessen the interest in those significant relations that are found, but it indicates strongly that it is not appropriate to look for their interpretation in terms specific to self-regulation.

It remains possible that there are subgroups within the total sample examined here for whom relations would be found. Zero-order and partial correlations were also obtained for each sex-site subgroup. The breakdown by sex allows examination of the possibility that sex differences in either maternal child-rearing behaviors, or in the child's reaction to such behaviors, lead to different patterns of relations. The site breakdown provides for the possibility that the meaning of some variables from the interview, particularly of status variables, will differ across the different geographic locations, most especially with respect to the contrast between the urban and rural sites.

Again, an examination of the matrices of correlations as a whole, rather than interpretation of individual coefficients, is required. With six matrices of correlations, each involving the relations of six self-regulatory variables to 28 interview variables[1], there are a total of 1008 zero-order correlations under examination. Thirty-six of these reached significance at the .01 level; 20 of these were correlations of MFF Errors with interview variables. There was no significant sex difference in the number of coefficients reaching significance--15 for males, and 21 for females. There was a site difference, with 27 reaching significance in the Lee County matrices, 6 in the Portland matrices, and 3 in those for Trenton. The larger

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[1] Scores 49B and 50B had smaller N's than the remaining 28 variables and were therefore omitted from these analyses.

sample size in Lee County than in either of the other two sites undoubtedly contributes to this difference to some extent, but it is extreme enough ($\chi^2 = 28.5$, $p < .001$) to suggest that additional factors are contributing.

When the partial correlations are examined, the number of significant coefficients decreases drastically. A total of eight coefficients out of 1008 remained significant when general ability was partialled out--one in Lee County, five in Portland, and two in the Trenton matrices. Not only is this number of significant coefficients slightly below the chance expectation, but the difference in number in favor of the Lee County sample is eliminated. It appears that in the sex by site subsamples, as in the total sample, there is no evidence for any relations between interview and self-regulatory scores other than through variance which both share with general ability; and that, in addition, there is a somewhat greater tendency in the Lee County sample than in the others for scores in all three domains to share common variance. The possibility can be raised here, though its confirmation or refutation will depend on structural analyses of Year 3 test data which have not yet been done, that the Lee County sample is following a somewhat slower course toward the differentiation of ability and ability-related variables.

Relationship of Year 1 Self-Regulatory Behaviors to Year 1 Interview Variables

Two years intervened between the maternal interview and the collection of the self-regulation data examined in the preceding section. The multiplicity of influences on the child's behavior over this period, as well as possible changes in important aspects of the home environment, could have obscured relations which would have emerged if the two domains had been assessed concurrently. A second set of correlational analyses was performed, therefore, to examine relations between Year 1 self-regulatory scores and Year 1 interview variables.

The matrix of zero-order correlations is presented in Table 22, and that of partial correlations (again, Year 2 Preschool Inventory score removed) in Table 23. Results are very similar to those presented in the preceding section. In the zero-order correlations, there were no significant coefficiencs involving the interactive scores, 17 with MFF Errors, 19 with MIT Slow, and one with MFF Latencies. In the partial correlation matrix, there were two significant coefficients involving the interactive scores and two each with MFF Errors, MIT Slow, and MFF Latencies. There is perhaps a tendency for MIT Slow scores to contain more of the same (general ability) variance as is contained in MFF Errors in Year 1 than in Year 3, possibly indicating more cohesion of ability-related scores (i.e., less differentiation) in the earlier year; and perhaps a tendency for MFF Latencies to share more variance than is associated with general ability in Year 3 than in Year 1. The general conclusion is the same as that in the preceding section--no association between self-regulatory scores and interview variables other than that which involves variance both sets of measures share with general ability.

Relationship of Year 2 Self-Regulatory Behaviors to Year 2 Interview Variables

The final set of analyses in this chapter involve the relations of Year 2 self-regulatory scores to Year 2 interview data. These analyses involve concurrent measurement in the two domains, at a point in time where at least some identifiable subgroups of subjects have progressed in their development toward integration of the several self-regulatory behaviors into a single dimension. They thus combine the advantages of each of the two sets of analyses reported above. However, the sample size was reduced since the interview was not given in Year 2 in Lee County, and fewer scores were available than in the

Table 22

Zero-Order Correlations Between Year 1 Self-Regulatory Scores and Year 1 Interview Variables

Interview Variables	N	Self-Regulatory Score: MFF Latency	MFF Errors	MIT Slow	Latency X Errors	Latency X Slow	Latency Squared
SDK	771.	.00	.11*	-.10*	-.03	-.01	-.04
25-30	768.	.03	.06	-.12*	-.01	.00	.02
31-35	770.	-.07	.19*	-.15*	.01	-.03	.04
ITEM 44	765.	.07	-.23*	.23*	-.01	.03	-.06
ITEM 45	686.	.05	-.30*	.22*	-.02	-.05	-.04
106-7	771.	.01	-.11*	.06	-.02	.00	.01
GROUP 3	771.	-.08	.00	.02	.06	-.02	-.01
119-124	771.	-.01	-.19*	.17*	-.01	-.02	-.09
199-204	771.	.06	-.19*	.11*	-.02	.01	-.05
GROUP 10	771.	.10*	-.21*	.23*	-.02	-.03	-.04
293-295	759.	.03	-.09	.11*	.02	.02	.01
ITEM 195	764.	.08	-.19*	.13*	.05	.03	-.09
GROUP 13	771.	-.06	.17*	-.18*	-.09	-.03	.09
ITEM 183	749.	.06	.00	-.04	-.01	.04	.00
AA	771.	.03	-.07*	.04	.03	-.04	-.03
MATN	771.	.04	-.16	.11*	-.02	-.01	-.03
ITEM 6	738.	-.02	-.06	.07	.05	.03	-.04
17-18	731.	-.06	.08	-.10*	.02	.01	.00
51-52	771.	.05	-.16*	.13*	-.03	.01	-.03
38,41	738.	.00	-.17*	.21*	.00	-.01	-.05
60,70	771.	.08	-.13*	.12*	-.02	-.04	.05
111,188	756.	.01	-.12*	.10*	-.02	-.04	-.01
ITEM 49A	748.	.01	-.02	.05	.06	-.03	-.04
ITEM 49B	237.	.03	.14	-.06	-.02	-.04	.08
ITEM 50A	724.	.03	-.14*	.09	-.04	.03	-.04
ITEM 50B	670.	.02	.01	-.02	.02	-.01	-.06
C.POS A	689.	.00	-.04	.11*	-.01	.01	-.03
C.POS B	771.	-.03	-.02	.01	-.08	-.01	.02
45/44	683.	.02	-.22*	.15*	-.02	-.07	-.07
GROUP 12D	770.	-.06	-.02	.07	.03	.00	-.01

* $p < .01$

Table 23

Partial Correlations Between Year 1 Self-Regulatory

Scores and Year 1 Interview Variables

		Self-Regulatory Score					
Interview Variables	N	MFF Latency	MFF Errors	MIT Slow	Latency X Errors	Latency X Slow	Latency Squared
SDK	771.	.00	.07	-.07	-.03	-.01	-.05
25-30	768.	-.03	-.02	-.05	-.01	.01	.01
31-35	770.	-.08	-.01	.02	.01	-.01	.01
ITEM 44	765.	.07	-.07	.09	-.01	.02	-.04
ITEM 45	686.	.06	-.11*	.05	-.02	-.08	-.07
106-7	771.	.01	-.07	.03	-.01	.00	.02
GROUP 3	771.	-.08	-.03	.04	.06	-.02	-.02
119-124	771.	-.01	-.09	.09	-.01	-.03	-.02
199-204	771.	.07	-.02	-.04	-.02	-.01	-.03
GROUP 10	771.	.12*	-.02	.08	-.02	-.05	-.02
293-295	759.	.03	-.03	.07	.02	.02	.01
ITEM 195	764.	.10*	.01	-.05	.06	.01	-.08
GROUP 13	771.	-.06	.10*	-.12*	-.10*	-.02	.08
ITEM 183	749.	.06	-.01	-.03	-.01	.04	.00
AA	771.	.04	-.02	-.01	.03	-.04	-.03
MATN	771.	.04	-.10	.05	-.02	-.02	-.02
ITEM 6	738.	-.02	-.05	.06	.05	.03	-.04
17-18	731.	-.06	.00	-.05	.02	.02	-.01
51-52	771.	.05	-.07	.05	-.03	.00	-.02
38,41	738.	.00	-.08	.14*	.00	-.02	-.04
60,70	771.	.09	-.04	.04	-.02	-.05	.06
111,188	756.	.01	-.09	.07	-.02	-.04	-.01
ITEM 49A	748.	.01	.03	.01	.06	-.04	-.04
ITEM 49B	237.	.03	.12	-.03	-.02	-.04	.08
ITEM 50A	724.	.03	-.08	.03	-.03	.02	-.04
ITEM 50B	670.	.02	.00	-.01	.02	.00	-.06
C.POS A	689.	.00	-.01	.09	-.01	.01	-.03
C.POS B	771.	-.03	-.04	.03	-.08	-.01	.02
45/44	683.	.02	-.08	.03	-.02	-.10*	-.05
GROUP 12D	770.	-.06	-.01	.06	.03	.00	-.01

* $p < .01$

preceding sections, since coding of open-ended questions has not yet been completed.

The zero-order correlations are presented in Table 24 and the partial correlations in Table 25, for the 469 subjects on whom Year 2 scores were available. Eleven of 126 coefficients in the zero-order matrix were significant at .01, most of them coefficients relating MFF Errors to interview scores. Only four of 126 were significant in the partial correlation matrix. Once again, no relations other than those deriving from variance shared with general ability are indicated.

In Year 2, females and higher SES children, but not males and lower SES children, showed evidence for the integration of self-regulatory behaviors (Ward, 1973). Coefficients were obtained, therefore, separately for each sex (both within each site, and combined over the Trenton and Portland sites for which data were available), and for each SES level (mother's education less than 10 years, 10-12 years, and greater than 12 years). These analyses, like the preceding, failed to find any relations with self-regulatory behaviors other than those mediated by general ability for any of the subgroups examined.

One last examination of the correlational data was made to assure that no consistent relations had been overlooked because of the emphasis in the preceding sections on the number rather than the content of significant coefficients. In Table 26 are listed those coefficients which were significant, in the analysis of the total available sample, for analyses employing Year 1, Year 2, and Year 3 self-regulatory scores. Coefficients from the partial correlational matrices were used to avoid overestimating consistency of correlational results due to covariance of scores with general ability.

Table 24

Zero-Order Correlations Between Year 2 Self-Regulatory Scores and Year 2 Interview Variables

Interview Variables	N	Self-Regulatory Scores: MFF Latency	MFF Errors	MIT Slow	Latency X Errors	Latency X Slow	Latency Squared
25-30	469.	.00	.11	-.10	-.09	-.04	-.13
31-35	468.	-.08	.18*	-.14*	-.11	.01	.02
ITEM 44	458.	.04	-.11	.11	.03	.03	-.03
ITEM 45	416.	.06	-.20*	.10	.09	.09	-.02
ITEM 106	454.	.04	.04	-.05	.02	.00	.09
ITEM 107	451.	-.05	-.05	.04	.05	.05	-.06
GRP 3	469.	.00	-.03	.00	.03	-.02	-.07
119-124	469.	.08	-.14*	.05	.01	-.02	-.02
199-204	469.	-.05	-.11	-.02	.07	.05	-.04
GRP 10	469.	.10	-.17*	.05	.06	.03	-.10
293-295	448.	.18*	-.13*	.06	.01	-.03	-.03
ITEM 195	462.	.06	-.23*	.11	.04	.04	-.09
ITEM 183	465.	.02	.04	.00	.10	-.06	-.06
AA	467.	-.05	-.07	.02	.03	-.02	-.04
MATN	469.	-.02	-.06	.18*	.03	-.01	-.08
38,41	352.	.08	-.04	.03	-.02	-.02	-.01
60,70	469.	.09	-.05	.06	.03	.03	-.06
111,188	462.	-.07	-.01	.03	.07	-.06	-.01
C.POS A	421.	-.02	.05	-.01	-.08	.0	-.04
C.POS B	469.	.01	.03	-.06	.06	.06	-.04
45/44	414.	.04	-.17*	.06	.08	.09	.00

* $p < .01$

Table 25

Partial Correlations Between Year 2 Self-Regulatory Scores

and Year 2 Interview Variables

Interview Variables	N	Self-Regulatory Score					
		MFF Latency	MFF Errors	MIT Slow	Latency X Errors	Latency X Slow	Latency Squared
25-30	469.	.02	.05	-.06	-.09	-.03	.12
31-35	468.	-.04	.04	-.05	-.11	.01	-.01
ITEM 44	458.	.01	.00	.04	.03	.02	.00
ITEM 45	416.	.03	-.11	.04	.09	.09	.01
ITEM 106	454.	.05	.01	-.03	.03	.00	.00
ITEM 107	451.	-.06	-.04	.03	.05	.05	-.06
GRP 3	469.	-.01	.02	-.02	.03	-.03	-.06
119-124	469.	.06	-.06	.00	.01	-.03	-.01
199-204	469.	-.06	-.07	-.06	.07	.05	-.03
GRP 19	469.	.08	-.12	.00	.05	.03	-.09
293-295	448.	.17*	-.10	.03	.01	-.03	-.02
ITEM 195	462.	.02	-.12*	.04	.03	.04	-.07
ITEM 183	465.	.03	.00	.02	-.10	-.06	-.07
AA	467.	-.06	-.03	-.01	.03	-.02	-.03
MATN	469.	-.04	.02	.14*	.03	-.01	-.06
38,41	352.	.08	-.03	.03	-.02	-.02	.00
60,70	469.	.08	.00	.03	.03	.03	-.05
111,188	462.	-.08	.01	.02	.07	-.06	-.01
C.POS. A	421.	-.03	.08	-.02	-.08	.05	-.04
C.POS. B	469.	.02	.01	-.05	.06	.06	-.04
45/44	414.	.03	-.13*	.02	.08	.09	.01

* $p < .01$

Table 26

Summary of Significant Partial Correlations Between Self-Regulatory Scores and Interview Variables in Each Year

Interview Variables	MFF Latency 1	2	3	MFF Error 1	2	3	MIT Slow 1	2	3	Latency By Error 1	2	3	Latency By Slow 1	2	3	Latency Squared 1	2	3
SDK[a]																		
25-30																		
31-35						*												
ITEM 44						*	*		*									
ITEM 45			*	*		*			*									
106-7[a]																		
GROUP 3			*															
119-124						*			*									
199-204			*			*												
GROUP 10	*					*			*									
293-295		*																
ITEM 195	*				*	*												
GROUP 13[a]				*		*	*			*								
ITEM 183																		
AA															*			*
MATN						*		*										
ITEM 6[a]																		
17-18[a]						*												
51-52[a]			*			*		*										
38,41						*	*											
60,70						*												
111,188				*														
ITEM 49A[a]																		
ITEM 49B[a]				*														
ITEM 50A[a]									*									
ITEM 50B[a]																		
C.POS A																		
C.POS B																		
45/44			*		*	*			*									
GROUP 12D[a]																		

a = comparable score not available in Year 2.

For Year 2, only 19 scores were available which were directly comparable to those for Years 1 and 3; those variables for which a score was not available in Year 2 are marked in the table with a superscript "a." Examination of the table indicates that there is no consistency, either significant or apparent, as to which variables show significant correlations.

Chapter 4

Personal-Social Behaviors and Self-Regulation

During the second year of data collection, ratings of the child's personal-social behaviors in the classroom were obtained. Detailed procedures for data collection and reduction are described in Emmerich (1971). Briefly, however, for those sites in which Year 2 was the Head Start year (Trenton, Portland and St. Louis), observations were made for all children in each preschool classroom where 50% or more of the students were members of the study population. (To the extent possible, those children tested in Year 1 and in classes containing fewer than 50% study-eligible subjects were also observed.) There were two observations of each child in the fall, and, in Portland and Trenton, an additional observation in the spring. Each observation consisted of a half-hour period of watching and note-taking by two raters, who then assessed the child's behavior on a total of 148 personality scales and behavioral items. The raters then discussed their independent judgments and arrived at a consensus rating for the child, which served as the data for that observation.

Structural analyses demonstrated the presence in these data of a three-dimensional configuration of behaviors similar to that obtained by Schaefer (1971) and others (Emmerich, 1971, 1973a,c). Ten constructs fell into a circumplex ordering in a two-dimensional space dimensionalized as Extraversion vs. Introversion and Warmth vs. Hostility. An additional dimension, containing eight constructs, offered a contrast between Task- and Peer-Orientation. This configuration was reliable, replicating within subgroups based on the child's sex, child's age at time of measurement in the fall, and fall vs. spring assessment. Thus, at a point in development when the cognitive domain has

apparently not achieved the degree of organization and differentiation which has typically been found in middle-class children, the young socioeconomically disadvantaged children in the Longitudinal Study sample have achieved an organization of personal-social behaviors comparable to that found in middle-class children.

The 18 constructs defining the three-dimensional configuration formed the base for a study of the relations of self-regulatory behaviors to the personal-social domain. Twelve additional indices from Emmerich's (1971) analysis were also included. Five each were the components of an orientation toward adults and of an orientation toward peers; the remaining two consisted of the bipolar scales for dependence-independence and masculinity-femininity. These indices did not define additional dimensions in the structural analyses beyond the three already discussed, and thus are somewhat redundant with the 18 constructs on which Emmerich has focused attention.

The analysis of personal-social relations to self-regulatory behaviors used procedures similar to those employed in examining relations with selected interview variables. Correlations were obtained between the personal-social ratings and each of six self-regulatory scores from each of the three years of data collection. Three of the scores were "simple," MFF Latency, MFF Error, and MIT Slow; two were the interaction scores, Latency X Error and Latency X Slow; and one was the score which provided a test of curvilinearity in latency relations to the construct measures, Latency Squared.

The children providing data were all those in the three-year three-site longitudinal sample on whom at least one fall observation of personal-social

behaviors was obtained. Thus, this sample is a much reduced one: only children in Trenton and Portland could be included, since no individual test data were collected in St. Louis in Year 3 and no personal-social observations were obtained in Lee County. This subsample also involves socioeconomic selectivity, since most of those observed were attending Head Start rather than private preschool classes. The result is a group of 220 children, on whom relevant data were complete for 198 cases in Year 1, 215 in Year 2, and 217 in Year 3. Correlations were obtained for this total group and separately for males and females, who were about equally represented in the total.

The personal-social ratings used were the average, for each child, of ratings from his two fall observations. Emmerich's (1971) analyses showed that, while levels of many of these behaviors changed from observation to observation, there were few instances of significant interactions between time of observation in the fall and other variables in predicting the personal-social behaviors. Averaging two observations should therefore have the effect of increasing the reliability of the ratings, while not obscuring their relations with other variables.

Tables 27 through 32 present the correlations between the six self-regulatory scores and the 30 personal-social variables. Tables 27, 29, and 31 give the zero-order correlations for Year 1, 2, and 3 self-regulatory scores, respectively, while Tables 28, 30, and 32 give the corresponding partial correlations, when variance shared with the Year 2 Preschool Inventory is removed. The picture obtained is one of virtually a total lack of relation. Of the 180 zero-order coefficients in each table, two are significant at the .01 level in the Year 1 self-regulatory analysis, eight

Table 27

Zero-Order Correlations Between Personal-Social Variables and Year 1 Self-Regulatory Scores

Personal-Social Variables	Self-Regulatory Score					
	MFF Latency	MFF Errors	MIT Slow	Latency X Error	Latency X Slow	Latency Squared
Sociable	.13	-.11	.06	.02	-.04	.01
Loving	.14	-.08	.15	.02	-.06	.07
Coop. Interpersonal	.07	-.13	.10	.08	-.03	.04
Coop. Impersonal	-.02	-.15	.07	.07	.03	-.03
Calm-Compliant	.01	-.02	.03	-.07	-.05	.02
Submissive	-.11	.12	-.02	.00	-.04	-.15
Withdrawn	-.12	.10	-.07	.07	.07	-.10
Distrusting	-.11	.06	-.06	-.02	.04	-.08
Defiant-Hostile	-.06	.08	-.11	-.06	.01	.08
Assertive	.07	-.13	.01	.03	-.01	.08
Adult Orientation	.08	-.15	.09	-.01	-.08	.03
Child Orientation	.18	-.06	.02	.00	-.02	-.01
Autonomous Achievement	.13	-.07	.11	.10	-.08	-.02
Cognitive Activity	.18	-.23*	.30*	.11	.03	-.06
Manipulative Activity	.05	-.02	.09	.15	-.08	-.12
Artistic Activity	.10	-.09	.07	.08	.04	-.12
Gross Motor Activity	.08	.02	-.03	-.05	-.02	.09
Fantasy Activity	.09	.08	.04	.06	.00	.06
Adult Affiliation	.08	-.13	.07	.03	.02	.05
Adult Info. Seeking	.12	-.12	.11	.03	-.13	-.05
Adult Attachment	-.04	-.07	.01	-.01	.03	.08
Adult Recog. Seeking	-.01	-.15	.07	-.09	-.15	-.03
Adult Social Control	.03	.03	-.04	-.03	-.01	.10
Child Affiliation	.18	-.10	.06	-.02	-.03	.05
Child Info. Seeking	.15	.01	.05	.04	.03	.00
Child Attachment	.02	-.04	-.04	-.01	.00	-.07
Child Recog. Seeking	.14	-.03	.00	.00	-.03	-.06
Child Social Control	.10	-.02	-.10	-.06	-.04	.09
Masculine-Feminine	-.05	-.07	.18	.11	-.09	-.15
Dependent-Independent	.05	-.04	.04	.02	-.06	.09

N = 198

*$p < .01$

Table 28

Partial Correlations between Personal-Social Variables and Year 1 Self-Regulatory Scores

Personal-Social Variables	Self-Regulatory Score					
	MFF Latency	MFF Errors	MIT Slow	Latency X Error	Latency X Slow	Latency Squared
Sociable	.13	-.04	-.01	-.02	-.06	.03
Loving	.14	.01	.08	-.03	-.09	.09
Coop. Interpersonal	.06	-.02	.00	.03	-.06	.06
Coop. Impersonal	-.02	-.11	.02	.05	.01	-.02
Calm-Compliant	.01	-.05	.05	-.06	-.05	.01
Submissive	-.10	.05	.05	.04	-.03	-.17
Withdrawn	-.12	.01	.01	.12	.09	-.12
Distrusting	-.10	-.03	.01	.03	.06	-.09
Defiant-Hostile	-.05	.07	-.10	-.05	.01	.08
Assertive	.07	-.05	-.07	-.02	-.04	.10
Adult Orientation	.08	-.15	.09	-.02	-.09	.03
Child Orientation	.18	-.02	-.02	-.02	.04	.00
Autonomous Achievement	.13	-.02	.07	.08	-.09	-.01
Cognitive Activity	.18	-.20*	.28*	.09	.02	-.06
Manipulative Activity	.04	.02	.05	.13	-.09	-.11
Artistic Activity	.10	-.09	.08	.08	.04	-.12
Gross Motor Activity	.08	.05	-.06	-.07	-.03	.09
Fantasy Activity	.09	.10	.03	.05	-.01	.06
Adult Affiliation	.07	-.09	.04	.01	.01	.06
Adult Info. Seeking	.12	-.13	.12	.03	-.13	-.05
Adult Attachment	-.04	-.05	-.01	-.02	.03	.09
Adult Recog. Seeking	-.01	-.18	.09	-.08	-.15	-.04
Adult Social Control	.04	.00	-.01	-.01	.00	.09
Child Affiliation	.18	-.03	.00	-.06	-.05	.07
Child Info. Seeking	.14	.05	.02	.03	.02	.00
Child Attachment	.02	-.01	-.07	-.02	-.01	-.07
Child Recog. Seeking	.14	-.02	-.01	.00	-.04	-.05
Child Social Control	.10	.03	-.15	-.09	-.05	.09
Masculine-Feminine	-.06	-.06	.19	.11	-.10	-.15
Dependent-Independent	.05	.06	-.05	-.03	-.09	.11

N = 198

* $p < .01$

Table 29

Zero-Order Correlations Between Personal-Social Variables And Year 2 Self-Regulatory Scores

Personal-Social Variables	Self-Regulatory Score					
	MFF Latency	MFF Errors	MIT Slow	Latency X Error	Latency X Slow	Latency Squared
Sociable	.12	-.18*	.14	-.01	.03	-.11
Loving	.11	-.21*	.22*	.04	.08	-.02
Coop. Interpersonal	.00	-.24*	.13	.05	.07	.00
Coop. Impersonal	.04	-.07	.10	.05	.08	.04
Calm-Compliant	-.09	.00	.14	-.01	.10	.12
Submissive	-.05	.14	.03	-.06	-.09	.12
Withdrawn	-.05	.18*	-.14	-.08	-.11	.03
Distrusting	-.01	.10	-.05	.00	-.06	-.01
Defiant-Hostile	-.02	.05	-.15	.07	-.01	-.09
Assertive	.06	-.16	.01	-.01	-.02	-.13
Adult Orientation	.05	-.03	.17	.02	.13	.02
Child Orientation	.10	-.20	.12	.04	-.03	-.13
Autonomous Achievement	.07	-.17	.19*	.07	-.01	-.06
Cognitive Activity	.12	-.13	.11	.04	.04	-.01
Manipulative Activity	.04	-.04	.14	.02	-.05	.00
Artistic Activity	.05	.02	-.03	.10	.04	-.02
Gross Motor Activity	-.06	-.10	-.02	.04	.00	-.06
Fantasy Activity	-.04	-.09	.03	.04	.01	-.13
Adult Affiliation	.04	-.08	.15	.00	.12	.02
Adult Info. Seeking	.09	.00	.11	.10	.14	.09
Adult Attachment	.02	.03	.03	.06	-.06	-.02
Adult Recog. Seeking	.06	-.01	.12	-.16	-.02	.01
Adult Social Control	-.01	.03	.06	-.07	.00	-.16
Child Affiliation	.09	-.21*	.12	.03	.02	-.09
Child Info. Seeking	.12	-.16	.08	.06	.01	-.17
Child Attachment	.06	-.02	-.01	.20*	-.01	-.00
Child Recog. Seeking	.03	-.12	.09	.02	-.06	-.13
Child Social Control	.04	-.05	-.01	.02	-.05	-.14
Masculine-Feminine	.06	-.05	.11	.01	.05	-.11
Dependent-Independent	.00	-.11	.03	.02	.08	-.07

N = 215

* $p < .01$

Table 30

Partial Correlations Between Personal-Social Variables and Year 2 Self-Regulatory Scores

Personal-Social Variables	Self-Regulatory Score					
	MFF Latency	MFF Errors	MIT Slow	Latency X Error	Latency X Slow	Latency X Squared
Sociable	.10	-.09	.08	-.01	.03	-.10
Loving	.09	-.11	.17	.04	.07	.00
Coop. Interpersonal	-.03	-.12	.06	.05	.06	.02
Coop. Impersonal	.03	-.01	.06	.05	.08	.05
Calm-Compliant	-.08	-.04	.16	-.01	.10	.12
Submissive	-.03	.04	.10	-.05	-.08	.11
Withdrawn	-.02	.08	-.08	-.08	-.10	.01
Distrusting	.01	.00	.01	.01	-.05	-.03
Defiant-Hostile	-.01	.03	-.14	.07	-.01	-.09
Assertive	.03	-.06	-.05	-.01	-.03	-.12
Adult Orientation	.04	-.01	.16	.02	.13	.03
Child Orientation	.09	-.15	.10	.04	-.03	-.12
Autonomous Achievement	.06	-.12	.16	.07	-.01	-.05
Cognitive Activity	.11	-.08	.08	.04	.04	.00
Manipulative Activity	.03	.02	.11	.02	-.05	.01
Artistic Activity	.05	.02	-.03	.10	.04	-.02
Gross Motor Activity	-.07	-.06	-.04	.04	-.01	-.05
Fantasy Activity	-.04	-.08	.02	.04	.01	-.13
Adult Affiliation	.03	-.03	.12	.00	.11	.02
Adult Info. Seeking	.09	.01	.11	.10	.14	.09
Adult Attachment	.01	.06	.02	.06	-.06	-.02
Adult Recog. Seeking	.07	-.04	.14	-.05	-.02	.01
Adult Social Control	.00	-.01	.08	-.07	.01	-.17
Child Affiliation	.07	-.14	.08	.03	.01	-.08
Child Info. Seeking	.11	-.13	.06	.06	.01	-.16
Child Attachment	.06	.02	-.03	.20*	-.01	.00
Child Recog. Seeking	.03	-.12	.09	.01	-.06	-.13
Child Social Control	.03	.01	-.05	.01	-.05	-.13
Masculine-Feminine	.06	-.05	.11	.01	.05	-.11
Dependent-Independent	-.03	.02	-.04	.01	.07	-.05

N = 215

* $p < .01$

Table 31

Zero-Order Correlations Between Personal-Social Variable and Year 3 Self-Regulatory Scores

Personal-Social Variables	Self-Regulatory Score					
	MFF Latency	MFF Errors	MIT Slow	Latency X Error	Latency X Slow	Latency Squared
Sociable	.04	-.10	.13	-.06	-.01	-.06
Loving	.10	-.16	.04	-.05	-.03	-.02
Coop. Interpersonal	.08	-.19*	.05	-.03	-.07	.05
Coop. Impersonal	.15	-.12	.06	-.07	-.17	-.08
Calm-Compliant	.04	.00	-.13	-.01	-.10	-.10
Submissive	.01	.09	-.09	-.02	.00	.03
Withdrawn	-.07	.10	-.08	.06	.08	.04
Distrusting	-.06	.14	-.09	-.01	.08	-.05
Defiant-Hostile	-.14	.03	-.01	.04	.00	.02
Assertive	.03	-.14	.12	-.06	.05	-.04
Adult Orientation	.07	.00	.01	-.09	.12	-.11
Child Orientation	.14	-.15	.13	-.10	-.06	-.15
Autonomous Achievement	.20*	-.18*	.04	-.04	-.03	.01
Cognitive Activity	.26*	-.24*	.09	.06	.02	.01
Manipulative Activity	.14	-.09	.08	-.02	.02	.06
Artistic Activity	.12	-.05	.08	-.07	.08	-.16
Gross Motor Activity	-.10	.09	.01	-.06	-.03	-.02
Fantasy Activity	.03	-.07	.02	-.06	-.10	-.05
Adult Affiliation	.10	-.04	.07	-.06	.08	-.08
Adult Info. Seeking	.12	-.04	.09	-.07	.04	-.12
Adult Attachment	.04	.02	.00	-.03	.02	-.11
Adult Recog. Seeking	-.05	.03	-.09	-.04	.17	.01
Adult Social Control	-.06	.08	-.03	-.04	.09	-.03
Child Affilation	.09	-.16	.15	-.09	-.06	-.13
Child Info. Seeking	.12	-.13	.08	-.10	-.07	-.11
Child Attachment	.01	.00	.04	.01	-.04	-.09
Child Recog. Seeking	.15	-.10	.12	-.05	-.01	-.07
Child Social Control	.01	-.06	.15	-.05	-.05	-.04
Masculine-Feminine	.13	-.12	.10	.00	-.02	-.01
Dependent-Independent	.03	-.10	.05	.01	-.10	.04

N = 217

* $p < .01$

Table 32

Partial Correlations Between Personal-Social Variables and Year 3 Self-Regulatory Scores

Personal-Social Variables	Self-Regulatory Score					
	MFF Latency	MFF Errors	MIT Slow	Latency X Error	Latency X Slow	Latency Squared
Sociable	-.01	-.02	.07	-.06	.01	-.08
Loving	.05	-.07	-.04	-.05	-.01	-.04
Coop. Interpersonal	.02	-.08	-.04	-.03	-.05	.03
Coop. Impersonal	.12	-.08	.02	-.07	-.16	-.09
Calm-Compliant	.06	-.03	-.12	-.01	.10	-.10
Submissive	.06	.01	-.03	-.02	.02	.05
Withdrawn	-.02	.01	-.01	.06	.06	.05
Distrusting	-.01	.05	-.03	.02	.06	-.03
Defiant-Hostile	-.13	.01	.00	.04	.00	.02
Assertive	-.02	-.05	.06	-.06	-.03	-.06
Adult Orientation	.06	.02	.00	-.09	.12	-.11
Child Orientation	.12	-.11	.10	-.10	-.06	-.16
Autonomous Achievement	.18	-.14	.00	-.04	-.02	.00
Cognitive Activity	.25*	-.21*	.06	.06	.03	.00
Manipulative Activity	.12	-.05	.05	-.02	.03	.05
Artistic Activity	.12	-.05	.08	-.07	.08	-.16
Gross Motor Activity	-.12	.14	-.02	-.06	-.03	-.02
Fantasy Activity	.02	-.06	.01	-.06	-.09	-.06
Adult Affiliation	.07	.00	.03	-.06	.09	-.09
Adult Info. Seeking	.12	-.04	.09	-.07	.04	-.12
Adult Attachment	.03	.04	-.02	-.03	.02	-.11
Adult Recog. Seeking	-.03	.01	-.07	-.04	.17	.02
Adult Social Control	-.04	.05	-.01	-.04	.08	-.02
Child Affiliation	.05	-.09	.10	-.09	-.05	-.15
Child Info. Seeking	.10	-.10	.05	-.10	-.07	-.12
Child Attachment	-.01	.03	.01	.01	-.03	-.09
Child Recog. Seeking	.15	-.10	.11	-.05	-.01	-.08
Child Social Control	-.02	-.01	.12	-.05	-.04	-.05
Masculine-Feminine	.13	-.13	.10	.00	-.01	-.01
Dependent-Independent	-.03	.01	-.03	.01	-.08	.03

N = 217

* $p < .01$

are significant in Year 2, and five are significant in Year 3. Removing variance shared with the Preschool Inventory reduces the number of significant coefficients to 2, 1, and 2, in Years 1, 2, and 3, respectively. This is approximately a chance-level number of significant coefficients.

It may be worth noting, however, that of the significant partial coefficients, four of the five involved the relation of one of the simple self-regulatory scores to the child's Cognitive Activity rating. Table 33 summarizes the correlations of MFF Latency, MFF Errors, and MIT Slow scores with Cognitive Activity; coefficients from the matrices done separately by sex are included as well as the correlations for the total sample. Only in Year 3 do MFF Latencies relate significantly to the child's rating of cognitive activity in preschool, while MIT Slow scores show significance before but not after the child's preschool experience, and MFF Errors show significance both before and after. None of the concurrent relations are

Table 33

Cognitive Activity Rating and Self-Regulation

		Zero-Order Correlations			Partial Correlations		
Score	Year	Total	Male	Female	Total	Male	Female
MFF Latency	1	.18	.18	.19	.18	.18	.19
	2	.12	.10	.14	.11	.09	.14
	3	.26*	.28*	.25*	.25*	.25	.25
MFF Errors	1	-.23*	-.19	-.26	-.20*	-.15	-.26
	2	-.13	-.22	-.05	-.08	-.15	-.02
	3	-.24*	-.21	-.26*	-.21*	-.16	-.25*
MIT Slow	1	.30*	.31*	.30*	.28*	.26*	.29*
	2	.11	.11	.11	.08	.05	.10
	3	.09	.09	.10	.06	.03	.08
N	1	198	103	95			
	2	215	108	107			
	3	217	109	108			

*$p < .01$

significant. However, the overall pattern is one of similarity in the coefficients across years as well as across sexes, and the year to year comparisons do not result in significant differences. In general, then, there is a tendency for high ratings on Cognitive Activity to be associated with higher self-regulatory scores. No direction of causation can be inferred, since the relation appears with self-regulatory scores obtained both before and after the ratings were made, possibly indicating both that a preference for cognitive activity is more likely to be found in those who are relatively high on the ability to modulate their behavior--and so are able to give cognitive activities the sustained attention and concentration required for success--and that those who opt to devote time to cognitive activities in one year are more likely to be advanced in self-regulatory behavior in the next--perhaps because their attempts to solve cognitive problems require them to develop their self-regulatory skills.

Relations between self-regulation and personal-social behaviors were examined separately by sex. Males showed no more significant associations than expected by chance; only four of 540 zero-order, and two of 540 partial correlations, were significant at .01. For the females, 27 zero-order coefficients and 13 partial correlations were significant. Each of these proportions is significantly greater for females than for males; by sign test, $p < .001$ for zero-order and $p < .01$ for partial correlations. While this is by no means an overwhelming number of significant relations, it is sufficient justification to search for any patterns or clusters of relations which may be evident in the data for females.

A consistent set of relations appears when correlations of self-regulatory scores with the 10 circumplex scales are examined in females.

Of the 11 coefficients significant at the .01 level, eight involve relations of MFF Errors to these scales. The zero-order and partial correlations with errors are given in Table 34. In the zero-order correlations, while the number of significant coefficients is relatively small, there is a perfect circumplex ordering of the magnitudes of the coefficients, and the pattern is highly comparable in all three years. Those who are high on errors in each year tend to be more Submissive and Withdrawn, while those who are low on errors are Assertive and Sociable, and, especially for those low in errors in Years 2 and 3, more Loving. While these correlations suggest some slight loading on the warmth-hostility dimension which is one of the vectors frequently used in defining the two-dimensional space of the circumplex, the major association is between errors and Introversion-Extraversion.

Table 34

Zero-Order and Partial Correlations Between MFF Errors and Circumplex Scales for Females

	Zero-Order Correlations			Partial Correlations		
Scale	Year 1	Year 2	Year 3	Year 1	Year 2	Year 3
Sociable	-.22	-.25*	-.25*	-.06	-.09	-.12
Loving	-.14	-.33*	-.28*	.01	-.20	-.18
Cooperative-Interpersonal	-.13	-.16	-.23	.05	.02	-.10
Cooperative-Impersonal	-.02	-.06	-.21	.09	.04	-.14
Calm-Compliant	.08	.09	-.04	.03	.04	-.09
Submissive	.33*	.27*	.15	.18	.10	-.01
Withdrawn	.21	.23	.23	.05	.08	.10
Distrusting	.12	.19	.21	-.06	.02	.08
Hostile	.01	-.06	.04	.04	-.05	.06
Assertive	-.27*	-.24	-.25*	-.11	-.07	-.12

*$p < .01$

Examination of the partial correlations also presented in Table 34 shows that the major part of the variance held in common by the circumplex scales and MFF Errors is general ability variance. Thus, the reasonable interpretation is suggested that these children are sensitive to their own ability, or lack of it; and that those who are cognitively more able tend to be relatively more forward in their interactions with others in the preschool setting. Compatible with this interpretation are the significant positive correlations which were found between the Brown IDS Self-Concept Test score, an index of the child's self-esteem or feelings of self-worth, and cognitive measures in the Years 1 and 2 analyses of the individual test battery (Shipman, 1972b); while a part of that correlation may be attributed to the more able child's better understanding of the relatively complex questions which are posed, the correlation may also reflect a genuinely greater self-confidence in children of higher general ability, which then leads to their assuming a more active and interactive stance in a social setting.

It is also worth noting that MFF Errors for females is not different from other self-regulatory scores in pattern so much as in degree in its relations with the circumplex variables. The following procedure was used to examine the similarity between MFF latencies and MFF errors in their pattern of relations with the circumplex variables. First, within each year's error data, correlations with the circumplex variables were ranked from 1 (the highest positive correlation) to 10 (the highest negative correlation). These ranks were then summed across the three years, and the sums reranked from 1 to 10 to provide a reasonably stable index of the pattern of relations between errors and circumplex variables. The same procedure was then employed with the Latency by circumplex correlations

to yield a stable index of latency relations to the circumplex. Finally, the rank-order correlation rho between these two sets of ranks was computed. For females, latencies and errors had a rank order correlation of -.93 ($p < .01$), indicating that, though latencies have far weaker and mostly non-significant relations with circumplex variables, their pattern of relations is almost identical to that of the error scores. Long latencies for girls tended to be associated with higher ratings on Assertive, Sociable, and Loving, while short latencies were associated with higher ratings on Submissive and Withdrawn.

This same procedure can be applied more generally to the comparison of patterns of relations with the circumplex variables, though it should be recognized that it provides a very weak test of possible similarities of pattern. The low magnitudes of the correlations involved, combined with the relatively small N's on which they are based (samples of around 100 cases), leads to rankings based on correlational differences which are very small in relation to the sampling errors involved; and the averaging procedure, intended to increase the stability of the rankings, does so only to the degree that there is no change in pattern over the three-year period. In addition, the N for the evaluation of significance of the rank-order correlation is 10, the number of ranks which are being compared, so that a high coefficient is required for statistical significance.

Table 35 presents the rank-order correlations between magnitudes of MFF Error correlations with circumplex variables for females, and rankings based on other self-regulatory scores for both males and females. The coefficients are high enough to suggest that there is no qualitative difference across either the sexes or the several self-regulatory scores,

in the relation of the latter to the circumplex scales. No stronger claim than this is warranted by these data.

Table 35

Similarities of Patterns of Self-Regulation Correlations with Circumplex Scales

		Females - MFF Errors	Females - MFF Errors PSI Partialled Out
Female	MFF Latency	-.92*	-.67+
	MIT Slow	-.74+	-.56
Male	MFF Errors	.70+	.36
	MFF Latency	-.76+	-.76+
	MIT Slow	-.52	-.29

+ $p < .05$
* $p < .01$

Turning to the Task- vs. Person-oriented dimension, there are eight significant correlations in the matrix for females. Four correlations, scattered across years and scores, suggest an association between higher levels of self-regulatory behaviors and greater task-orientation; three of these are the significant correlations presented in Table 33 involving Cognitive Activity ratings. In addition, three scattered correlations suggest that higher levels of self-regulation are associated with a greater orientation to children. Since Child Orientation is a central marker for the Person-oriented pole of the third dimension, while Cognitive Activity marks the Task-oriented pole, these are seemingly contradictory relations. However, task- and person-oriented measures tend to be unrelated rather than negatively related, and both tend to be associated positively with ratings of Assertive and negatively with Withdrawn (Emmerich, 1971). Thus,

the present findings are compatible with those discussed above involving circumplex variables, in that individuals higher on self-regulatory behaviors tend to be more actively involved in several different aspects of the preschool setting.

The remaining suggested consistency in the correlations for females concerns an association between self-regulation and the components of child- and adult-orientation. Three significant correlations suggest that those high on self-regulation tend to seek recognition from or affiliation with children, while two suggest that these individuals are lower on attachment to or seeking recognition from adults. Perhaps a maturity or dependence difference is implied; during this age period attachment to adults, in particular, is likely to imply shyness and lack of full and active participation in the classroom.

It should be emphasized that the interpretations given above are over-generalizations and should be viewed as highly tentative. The magnitudes of correlations between self-regulation and personal-social variables are low. There are more significant correlations than would be expected by chance, but only for females, and even there not many more than might be obtained by chance. With regard to the relations between MFF Errors and the circumplex variables for females, the patterning of results shows enough consistency over time and over the 10 circumplex scales to warrant some confidence that it is real, though it is also partly a function of variance which is shared among personal-social measures, self-regulatory scores, and general ability. With regard to the remaining significant relations found, these are better characterized as scattered and suggestive.

Chapter 5

Individual Stability and Change in MFF Performance

The earlier analysis of stabilities of self-regulatory scores was based largely on correlations of MFF latencies and of MFF errors across years. Latencies were found to have low stability, with year to year correlations for the three-year three-site longitudinal sample of .16 and .19, while errors had correlations of .48 and .47, for Years 1 to 2 and 2 to 3, respectively. These correlations, however, provide an incomplete representation of the stability or consistency of change present in the data. It remains possible that some substantial subgroup of the total sample shows much greater stability in performance than is indicated by the overall correlational results. In fact, one indication of such a finding was provided in the earlier report when correlations between Year 2 and Year 3 latencies were examined for groups defined on the basis of maternal education. These correlations were .13 for individuals whose mothers had less than 10 years of education, .21 for those with maternal education between 10 and 12 years, and .37 for those with maternal education greater than 12 years. Thus, there was moderate stability for those identified as higher SES within the sample, despite the low stability coefficient for the sample as a whole.

Further, stability of individual performance is only one of the possible varieties of consistency over time. It may be that there are substantial contingencies in performance from one year to the next which reflect consistency of change rather than of position. This possibility is seen more clearly by conceptualizing individuals as falling into one of four cells in MFF performance--"reflective", or slow-accurate;

"impulsive", or fast-inaccurate; fast-accurate; and slow-inaccurate.[1] Stable individual performance implies that whichever cell the child occupies in a given year is the one in which he is likely to fall the following year. Equally interesting would be the possibility, for example, that for those who were not reflective in Year 2, there were differential probabilities of becoming so by Year 3; perhaps those who were impulsive in Year 2 would show a greater probability of becoming reflective in Year 3 than would those who were slow-inaccurate in Year 2. Such a finding could be interpreted as indicating that the former were displaying a change in stylistic performance, perhaps because they had learned the relevance of a more thoughtful approach to the task, while the latter showed an ability deficit which would be less easily overcome.

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[1] The labels "reflective" and "impulsive" imply more than that the individuals involved have, respectively, high latency-low error and low latency-high error. These latter terms are descriptive of the MFF performance, while the former imply the process by which the individual achieves this status. Reflectives, according to the conceptualization advanced by Kagan (e.g., Kagan, Rosman, Day, Albert & Phillips, 1964), are those who delay their response choice in order to assure that the choice will be correct; thus, their low error scores are in part a consequence of their ability to delay response and of the information processing in which they engage during the delay interval. Similarly, impulsives are those who are unwilling or unable to delay sufficiently to allow a correct choice; their high errors are in part due to the inadequacy of their response delay and of the information processing which occurs during the delay.

The terms "reflective" and "impulsive" are given in quotation marks in the text and tables to emphasize that their use in a sense begs the question. A major purpose of this chapter, as well as of the earlier report, is to discover at what point in development individuals who are slow and accurate can appropriately be labeled reflective and to trace the developmental sequence that leads to the relevance of reflection-impulsivity for performance.

The labels "fast-accurate" and "slow-inaccurate" are more descriptive; Kagan's theorizing does not suggest a process explanation for the performance of these groups. It is compatible with his interpretation to see these as individuals who are, independently, both quick in response tempo and bright, or slow in tempo and not bright; that is, response speed and accuracy in these groups may be attributable to different, perhaps unrelated factors, rather than having the functional relation which is posited for individuals in the reflective and impulsive groups.

To investigate these possibilities, MFF latencies and errors in each of the three years were dichotomized at their medians for the year, allowing the placement of the child in one of the four cells in each year. Contingency analyses were then performed to indicate what relations existed between the child's placement in these cells in one year and his performance in the next.

The overall contingency tables on which the analyses are based are given in Tables 36 and 37. Table 36 provides a complete cross-classification in performance in Years 1 and 2; that is, each entry is the frequency with which children in one of the four MFF cells based on Year 1 performance fell into each of the four MFF cells based on Year 2 performance. Table 37 provides a similar cross-classification of performance in Years 2 and 3.

A first question to be raised in considering these data is whether the dichotomized data show the same pattern of association (and lack of association) between latencies and errors in each year as was found in the earlier correlational analyses (Ward, 1973). Chi-square analyses indicated there was no relation between latencies and errors in Year 1 ($\chi^2 < 1$), a significant relation in Year 2 ($\chi^2 = 20.90$, $p < .001$) and a still stronger relation in Year 3 ($\chi^2 = 79.58$, $p < .001$). Thus, the same overall pattern of results was obtained from the contingency analyses as from the correlational analyses of the earlier report.

Information on the consistency of performance from Year 1 to Year 2 is given in Table 38. Each row in the table represents the Year 2 performance of one of the four groups based on the Year 1 classification. Thus, the first row indicates that of those who were "reflective" in Year 1 (by definition, above the median on latencies and below the median

Table 36

Contingencies Between Year 1 and Year 2 MFF Performance

	Year 1				
	"Reflective" (High Latency-Low Error)	Fast-Accurate (Low Latency-Low Error)	"Impulsive" (Low Latency-High Error)	Slow-Inaccurate (High Latency-High Error)	Total
Year 2					
"Reflective"	95	70	35	55	255
Fast-Accurate	63	70	25	18	176
"Impulsive"	20	42	83	65	210
Slow-Inaccurate	31	28	50	60	169
Total	209	210	193	198	810

Table 37

Contingencies Between Year 2 and Year 3 MFF Performance

	Year 2				
	"Reflective" (High Latency-Low Error)	Fast Accurate (Low Latency-Low Error)	"Impulsive" (Low Latency-High Error)	Slow-Inaccurate (High Latency-High Error)	Total
Year 3					
"Reflective"	132	65	38	33	268
Fast-Accurate	38	46	27	20	131
"Impulsive"	42	46	130	79	297
Slow-Inaccurate	47	28	48	50	173
Total	259	185	243	182	869

on errors), 60% remained above the latency median in Year 2 and 24% were above the error median in Year 2.

Table 38

Year 2 Performance for Groups
Based on Year 1 Classifications

Year 1 Group	N	Year 2 Performance: Proportion With Latencies Above Year 2 Median	Year 2 Performance: Proportion With Errors Above Year 2 Median
"Reflective"	209	.60*	.24**
Fast-Accurate	210	.47	.33**
"Impulsive"	193	.44	.69**
Slow-Inaccurate	198	.58	.63**

*$p < .01$.
**$p < .001$.

Subjects were consistent in their error classification from Year 1 to Year 2. Those in the two groups high in errors in Year 1 ("impulsives" and slow-inaccurates) remained high, with 69% of the former and 63% of the latter falling above the Year 2 median on errors. Those in groups low in errors ("reflectives" and fast-accurates) remained low, with 24% of the former and 33% of the latter falling above the error median. For each comparison, the difference from "chance" (50% above and 50% below the median) was significant at .001. Neither "reflectives" and fast-accurates, nor "impulsives" and slow-inaccurates, differed in their proportion above the error median; all the remaining comparisons--between a group that had been high error in Year 1 and one that had been low--showed differences significant at .001 or better.

There was also a tendency for groups to remain consistent in their latencies over time, but in three of the four groups this tendency did not result in a proportion above the overall median which was significantly different from chance. Year 1 "reflectives" did not differ significantly from Year 1 slow-inaccurates in their Year 2 latencies, nor did Year 1 "impulsives" differ from Year 1 fast-accurates.

Table 39 presents the comparable effects for latency and error scores in Year 3, based on the individual's classification into one of the four groups in Year 2. In some respects the results in this table parallel those in Table 38. Errors were consistent across years for all groups, with those in the two high-error groups in Year 2 being significantly more likely to be high in errors in Year 3, and those in the two low-error groups in Year 2 being more likely to be low in errors in Year 3; $p < .001$ for three of the four groups. Each of the two groups with high Year 2 errors differed significantly from each of the two low-error groups in the probability that the subject would be high-error in Year 3 ($p < .001$), while neither the high-error nor the low-error groups differed from one another.

In latencies, those who were "reflective" in Year 2 were significantly more likely to have long than short latencies in Year 3 ($p < .001$), while those who were "impulsive" in Year 2 were more likely to have short Year 3 latencies ($p < .001$). The two remaining groups, however, did not show significant departures of latencies from a "chance" level. Those who were fast-accurate in Year 2 were almost equally likely to be above or below the group median in latencies in Year 3, while those who were slow-inaccurate in Year 2, tended, nonsignificantly, to be below the median in latencies in Year 3. Year 2 "reflectives" had longer latencies than any other group

in Year 3 ($p < .001$ for each comparison); Year 2 "impulsives" had shorter latencies than any other group in Year 3, significantly so for two of the three comparisons.

Table 39

Year 3 Performance for Groups
Based on Year 2 Classifications

		Year 2 Performance	
Year 2 Group	N	Proportion With Latencies Above Year 3 Median	Proportion With Errors Above Year 3 Median
"Reflective"	259	.69**	.34**
Fast-Accurate	185	.50	.40*
"Impulsive"	243	.35**	.73**
Slow-Inaccurate	182	.46	.71**

*$p < .01$.
**$p < .001$.

The most notable difference between Tables 38 and 39 is that from Year 1 to Year 2. Subjects tended to maintain their position with respect to latencies, though regressing toward the mean of the group to such a degree that three of the four groups failed to show a significant disproportionality in latencies in Year 2. From Year 2 to Year 3, however, only those subjects whose performance appeared to fit the requirements of a reflective or impulsive style in Year 2--long latencies with low errors, or short latencies along with high errors--remained consistently high or low in latencies in Year 3. Those whose Year 2 performance did not fit these requirements--those with long latencies in a context of high

error or short latencies with few errors--showed a shift in latencies in accord with the expectations based on the stylistic variable.

A more direct demonstration of these tendencies can be given by examining the prediction of latencies from one year to the next, separately for those whose latencies and errors were "consistent"[1] and for those for whom they were discrepant in a given year. When Year 2 latencies were predicted from Year 1 performance, the prediction that subjects would show stability in latencies over time (i.e., that latencies in Year 2 would be long if and only if they were long in Year 1) was correct for 58.2% of those whose latencies and errors were consistent and for 55.6% of those whose latencies and errors were discrepant; these two proportions do not differ from one another ($p > .40$), though the first reaches significance at .001 and the second does not. Thus, prediction was slightly better than chance and was about equally good for the two groups. When Year 3 latencies were predicted from Year 2 performance, however, the prediction was good for those whose latencies and errors were consistent (correct prediction for 66.9% of the cases, $p < .001$) but was slightly, and non-significantly, worse than chance for those whose latencies and errors were discrepant (correct prediction for 47.7% of the cases). The prediction was correct significantly more often for those in the former group than for those in the latter ($p < .001$).

The analyses in this chapter support the conclusion reached in the earlier correlational approach to the development of self-regulatory behaviors: development toward a coherent dimension of self-regulatory behavior is not evidenced in Year 1, has begun in Year 2, and is apparent

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[1] Latencies and errors are "consistent" if, in line with Kagan's theorizing, latencies are high in conjunction with low errors, or low in conjunction with high errors.

throughout the sample in Year 3. They suggest, as well, several observations as to the course of this development.

One point concerns the relation between the performance of the group and that of the individual. A correlation coefficient provides information on whether a group of individuals gives evidence of the existence of a contingency between two scores. In the absence of a strong correlation, the four-fold table--those high vs. low on one score by those high vs. low on the other--contains almost equal numbers of individuals in each of the four cells. One possible meaning of a weak association of this sort is that the two variables are nearly independent so far as the members of this group are concerned. A second, quite different possibility is that for some individuals in the group, the two variables are strongly related, while for others they are independent. In the present case, this second interpretation would mean that for some individuals, their long latencies and low errors imply that they are reflective--i.e., in line with discussions of the stylistic dimension reflection-impulsivity, their long latencies represent withholding of decision in order to allow adequate information processing. Similarly, for some individuals, short latencies and high errors would imply impulsiveness--the tendency toward too quick a decision for an adequate examination of the alternatives. For other individuals, however, latencies and errors would be independent--both long and short latencies would occur in the presence of both high and low errors, depending on two not-directly-related variables, the child's level of ability and his tendency toward a fast or slow tempo in behavior.

The present results indicate that at a point in development when the group as a whole is showing a very low level of integration of self-

regulatory behaviors, the second interpretation is appropriate. From this time, those individuals whose latencies and errors are "consistent" remain stable in both their latencies and their errors a year later. By contrast, those whose latencies and errors are not consistent show changes in their latencies which serve to create consistency by the time of the later measurement, when the stylistic variable is relevant to performance of the group as a whole. Put more succinctly, there is an interaction between latencies and errors in Year 2 in the prediction of Year 3 latencies. These relations would be expected if the reflective-impulsive style is operating in some individuals in the second year, indicating the relevance of the stylistic variable for them, and if it is absent from that of other individuals at this time.

A second point has to do with the way in which individuals change over time so as to bring their performance into line with expectations based on the determination of performance by the reflective-impulsive style. It is evident that change is not unsystematic; individuals remain highly stable in their error scores, and it is latencies rather than errors which show changes over time. Moreover, as the analyses already discussed indicated should be the case, each row in Table 38, representing the Year 3 classification of individuals in one of the four Year 2 groups, has its largest entry in either the reflective or the impulsive cell, depending on the child's error score in Year 2 rather than on his Year 2 latency. Beyond this, there is no evident consistency in the table. For example, looking at subjects whose error scores went from high in Year 2 to low in Year 3, there was no significant tendency toward an association between their Year 2 latencies and their Year 3 latencies. Similarly, for those whose

error scores went from low in Year 2 to high in Year 3, there was no consistency of latencies over time.

From another perspective, it can be asked whether changes in error scores can themselves be predicted from latencies. Of those who responded quickly in Year 2, 33% showed changes in error scores from Year 2 to Year 3, while of those who responded slowly in Year 2, 32% showed changes. These relative frequencies are not significantly different from one another. Moreover, of those who responded quickly in Year 2 and changed in error scores from Year 2 to 3, 47% changed from high to low errors; of those who responded slowly in Year 2 and changed in errors from Years 2 to 3, 37% changed from high to low errors. These proportions, also, do not differ significantly from one another ($Z = 1.58$, $p > .1$).

Thus, where errors show changes over time, these changes are not predictable from latencies. When errors change, the subject's latencies are not predictable from either his latencies or his errors in the earlier year. And when errors remain stable over time, latencies are predictable from errors.

In brief, the present results are consistent with those presented in Ward (1973); they augment that discussion in two respects. First, they indicate that the low level of association between latencies and errors in the group, at an intermediate point in development, can be interpreted as showing a strong association in some individuals and no association in others, rather than a uniformly weak association throughout the group. Second, they show that where latencies and errors are discrepant, in terms of theorizing about the reflective-impulsive cognitive style, it is latencies rather than errors that change over time to bring about the consistency found in older individuals.

Chapter 6

Discussion

One of the major findings to emerge in the various analyses discussed in this report is that the earlier results from correlational analyses (Ward, 1973) were fully replicated in a finer-grained approach to the questions of stability and change in self-regulatory behaviors over the preschool years. Contingency analyses, which allowed an assessment of the number of individuals following a given developmental course on the MFF, gave results completely consistent with those which the correlational analyses provided for the group as a whole. In addition, these analyses suggested that, at a point in development where the group as a whole shows a low level of integration of self-regulatory behaviors, the group may be characterized as made up of two distinct classes of individuals. One class consists of those for whom latencies and errors are associated and functionally related--those whose long latencies indicate that they are delaying response to achieve high accuracy, and those whose short latencies indicate that they are failing to delay response adequately. The second class is composed of individuals for whom latencies and errors are not functionally related. These children may be of high or low general ability, and they may be of fast or slow personal tempo; but their description involves locating them on both these dimensions, and the causes and correlates of one of the two dimensions may be unrelated to those of the other.

Without some basis for distinguishing which individuals are reflective or impulsive in Year 2, and which are of fast or slow tempo and of high or low general ability, it is difficult to assess correlates of either set of constructs at that point in time. Moreover, a similar problem exists to

some degree in interpreting MFF performance in any year. However, in the present sample there cannot be many individuals in Year 1 for whom latencies and errors are functionally related. The overall failure to find contingency between latencies and errors would require that, if for some individuals there actually were a negative relation between these two variables, their influence on the contingency tables was counterbalanced by an equivalent number of individuals for whom there was a positive relation between the two. Although possible, this is not a likely event. There was no evidence, for example, of positive relations between general ability indices and the latency measures from the Sigel and PEFT tests which were interpreted as response tempo indices.

In Year 3, as in work with the reflection-impulsivity dimension in older children and adults, there are relatively more subjects for whom integration of latencies and errors has taken place. The assumption in analyses using these scores is that, although there may still be individuals for whom these variables represent independent characteristics, for a large proportion of the sample they are functionally related. Therefore, while the nonintegrated cases provide a source of error in searching for relations between self-regulation and other variables, their effect is to weaken rather than to obscure those relations as observed empirically. It remains possible, however, that stronger and more consistent relations between self-regulatory scores and other variables could be discerned, if there were some means by which to determine for which individuals the latencies and errors represent the operation of the reflection-impulsivity dimension.

In subsequent analyses, attempts will be made to find bases for such a discrimination within the Longitudinal Study data. One possibility, for

example, is to use item data from the MFF. Those children who have long latencies and low error scores, and who in addition have their own longest latencies on the items which the group data indicate are most difficult, are more likely to be truly reflective. The assumption here would be that the reflective child will adjust his delay interval in accord with the difficulty of the information processing task he faces on each trial, while the slow tempo child who is not reflective will not.

To what extent has the integration of self-regulatory behaviors, as shown through MFF latencies and errors, been completed by the time of Year 3 testing? It is possible to estimate the percent of individuals in each year who are responding according to conceptual style, and the percent who are showing only the effects of response tempo and general ability. Several assumptions are required. First, all those who are high on latency and high on errors, or who are low on latency and low on errors, are individuals for whom the two variables have not become functionally related. Second, there are the same number of individuals in the two remaining cells as in these first two cells, for whom the two variables are not functionally related. Subtraction of the sum of the first two cells from that of the remaining two will then give the number of individuals whose long latencies and low errors or whose short latencies and high errors indicate reflectiveness or impulsiveness. (A further assumption is made that errors in classification are not a source of systematic bias; for example, there should be the same probability that a child who is "truly" reflective will be misclassified by the test as short latency-low error, as that a child who is "truly" short latency-low error will be misclassified as reflective.)

Applying this reasoning to the present data, it is estimated that there are no cases of reflective or impulsive individuals in Year 1, that 16% of

the sample show the operation of the cognitive style in Year 2, and that 30% of the sample do so in Year 3.[1] These numbers may be compared with the estimates given in Table 40 for studies by other investigators. It should be noted that there are many studies in the literature in which only correlational results are reported, so that the calculations cannot be made from the published information.

There is more diversity than consistency in the table. One study reported (Harrison & Nadelman, 1972) found only 26 of 50 subjects to fall in the reflective or impulsive cells, leading to an estimate of 4% of the sample as "truly" reflective or impulsive. In light of this distribution of cases, the significant correlation reported between latencies and errors ($r = -.36$, $p < .01$) must be viewed with suspicion, as possibly indicating the influence of a few highly deviant scores. It is of some interest that this study, and the one (Katz, 1971) reporting the next lowest relative frequency, both used preschool samples. At the other extreme, Kagan (1966a) reported results indicating that 72% of a first grade sample were reflective or impulsive. (However, see Note b, Table 40.) In general, there seems to be a tendency for the percent of the sample showing a functional relation between latencies and errors to increase with the age or grade level of the children; but the dispersion of results is too great to permit any such conclusion to be made with confidence from this sample of studies.

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[1] For example, as seen in Table 37, a total of 304 children fall into the Fast-Accurate and Slow-Inaccurate cells in Year 3. It is assumed that their latencies and errors have not been integrated into a dimension of self-regulatory ability, and that a comparable number of children in the "Reflective" and "Impulsive" cells have also not completed this developmental step. Of the 565 children in the two latter cells, therefore, it is assumed that 261 (565-304) have completed this integration. 261 divided by the sample size, 869, gives 30% as the proportion of the group which is truly reflective or impulsive in the Year 3 sample.

Table 40

Percent of Sample Which is "Truly" Reflective or Impulsive
In Published MFF Studies

	N	Percent of Sample
Preschool Age		
Harrison & Nadelman, 1972	50	4
Katz, 1971	67	31
Meichenbaum & Goodman, 1969	30	67
Kindergarten		
Odom, McIntyre & Neale, 1971[a]	101	43
Grade 1		
Kagan, 1966 (a)	155	72
Kagan, Peason & Welch, 1966[b]	155	38
Messer, 1970 (b)[c]	65	48
Grade 3		
Eska & Black, 1971	100	38
Kagan, 1966 (b)	243	67
Messer, 1970 (a)[d]	131	40
Reali & Hall, 1970	167	35

Notes. [a]Percent of sample is a minimum estimate; the published information was incomplete.

[b]Apparently the same sample as in Kagan, 1966 (a). The difference in results might arise from the use of within-sex median splits in classifying subjects in Kagan, 1966 (a), but of total group median splits in Kagan et al., 1966.

[c]Part of the Kagan et al., 1966, sample.

[d]Overlaps partially with the Kagan et al., 1966, sample.

A typical value in Table 40, either for all those studies listed or including only those with third grade children, is for approximately 40% of the sample to have achieved integration of latencies and errors. This level, therefore, may provide a reasonable representation of what is to be expected of a "typical" group of elementary school children. Comparison with the Year 3 results from the present sample, in which 30% of the children could be classed as reflective or impulsive, suggests that some further development toward coherence of the self-regulatory behaviors may be expected after the kindergarten year. This 10% increase may greatly enhance the possibility of detecting relations between MFF performance and expected correlates, since it represents an increase of one-third in the proportion of children for whom the MFF scores do indeed provide an index of reflectiveness or impulsivity.

This analysis emphasizes the desirability of discovering some technique by which to infer whether or not MFF performance provides a measure of reflectiveness or impulsiveness for a given subject. When the numbers are presented as they have been here, the impressively high negative correlations between latencies and errors which have been reported in many studies obscure the fact that a large percentage of any given sample fails to follow the theoretical expectation in their performance.

A second finding from the contingency analyses is that latencies in one year by themselves have no predictive power to latencies in the subsequent year, once the group as a whole has begun to show progress toward the integration of self-regulatory behaviors. The correlational analyses had indicated that errors had moderately high stability over time, while latencies were much less stable. Contingency analyses showed in addition

that in the "inconsistent" cases, where either long latencies and high errors or short latencies and low errors were found in Year 2, latencies tended to move toward consistency with the error scores in Year 3; and that, in the less frequent cases in which error scores changed their classification from Year 2 to Year 3, the change was not associated with the earlier latency score. This asymmetry in predictability of change has some implication for the course of developmental change in self-regulation. That is, it does not fit possible models in which the child begins with a more general response tempo, either fast or slow, and then somehow develops the capacity or inclination to do whatever information processing his tempo allows for; in this case, latencies would be expected to remain stable over time, while errors remained stable or changed in classification toward consistency with the latency scores. Nor does it fit a model in which the crucial development is in the child's delay capacity, such that information processing abilities are not brought to bear on the problem presented by the MFF until the child's response tempo has increased to a threshold level at which he now has time for adequate processing. This model would predict a triangular relation between latencies and errors. Once latencies become long enough, the great majority of individuals should have low error scores. In those with short latencies, errors could be high or low depending on general ability level. There was no evidence for a relation of this form, either in the contingency tables or in the scatterplots relating latencies and errors. Moreover, the change in latencies from year to year was relatively small in absolute terms; for example, about 28% of the subjects in Year 1 had latencies as long as the median latency for the group in Year 3. Since this median latency was sufficiently long for many subjects in Year 3 to show a functional relation between latency and error scores,

the model in question would indicate that many of those 28% should have shown that relation in Year 1.

The model which was proposed in the earlier report on self-regulatory behaviors (Ward, 1973), on th other hand, does fit the results for changes in errors and latencies. The child is seen as having a delay capacity which he must learn to bring to bear in cognitive problem solving. He may have long or short latencies, depending on other factors; but it is only when he begins to apply his delay capacity in the service of problem solving that his latencies become relevant for accuracy of performance.

This model nonetheless contains an asymmetry which presents some conceptual difficulty. It is intuitively reasonable that a child should improve his performance by learning to use his capacity to delay response in the service of careful information gathering and decision making. It is less obvious that some children should decline in accuracy because they begin to apply an inadequate delay capacity in the test situation. This possibility arises, however, because of the way in which the classification of individuals into high and low error groups is done; that is, it is based on the performance of the sample as a whole within each year's data. The group as a whole changes in error scores from one year to the next. Holding latencies constant, the same delay period is sufficient for the Year 3 child to achieve a higher level of accuracy than can be achieved by the child in Year 2. Thus, the child who moves from low errors in Year 2 to high errors in Year 3 may not increase in his absolute number of errors; rather, he has failed to improve sufficiently to remain below the error median of a group which on the whole has shown substantial improvement. In the early years, most children are unreflective; if almost no children delay response long

enough for good decision making, those who are bright will be those who tend to achieve the lower error scores. In subsequent years, however, when some individuals begin to delay response so that their full ability can be brought to bear in the situation, high general ability may not be enough; only those children who are able to give the decision more than a brief processing span will succeed in being accurate enough to fall below the error median for the group.

The large extent to which the MFF provides a confounded measure--cognitive stylistic behavior in some individuals, response tempo and general ability in others--may help to explain why relatively few significant relations were found between MFF scores and other variables examined in this report. It is true that other studies have generally had the liability of a similar degree of confounding in the MFF; however, most other investigations involving MFF correlates have not faced to the same degree problems of long time intervals between the variables under consideration, and of major differences in measurement technique between the constructs assessed. Kagan's investigations of the relations between reflection-impulsivity and both conceptual reasoning and reading ability, for example, used mainly concurrent measurement in the several domains under consideration, and were largely successful in finding interdomain relations in those instances where the task formats were similar. His test of inductive reasoning, for example, presented a series of the form AaBbC?, and required the child to indicate which of several alternative "c" choices completed the series; thus, the format was that of the MFF, involving the choice of one alternative from among several in a condition of response uncertainty (Kagan, Pearson & Welch, 1966). Likewise, the strongest relation found between reflectiveness and reading was obtained

in a reading task that involved choosing one word among several similar ones printed on a card (Kagan, 1965). The present study has gone farther afield than these and the majority of others that have been reported in attempting to find correlates of MFF performance.

The possibility must be taken seriously that the MFF does not provide a sensitive enough measure of the stylistic tendency to uncover relations of only moderate strength and which may be partially obscured by the passage of time and the intervention of unknown uncontrolled influences on behavior. It may be, then, that the use of MFF data at a point in development where greater integration of the behavior has occurred, and the development of a procedure whereby at least good guesses can be made as to which subjects "really" indicate reflectiveness or impulsiveness through their performance on latency and error measures, will be necessary before an adequate test has been made of the possible relations between the stylistic variable and other child behavioral and situational variables.

It may be, also, that a better measuring operation than the MFF can be found for the assessment of the tendency toward reflectiveness or impulsiveness. That is, it may be that there are other tasks which meet the conceptual requirements for the measurement of the stylistic dimension, which would succeed to a greater extent than the MFF in sorting individuals into those who are reflective and those who are impulsive. If such a task were found, an important revision in some of the preceding discussion would be required. Rather than concluding that reflection-impulsivity is relevant to the performance on only about 40% of elementary school children, it would be appropriate to conclude that the MFF is an adequate measure of that dimension for only 40%. Some of the remaining individuals might

then also be classified as reflective or impulsive; these would be children for whom response tempo and general ability played a large enough role in the MFF to override the expression of cognitive style in that test situation, but who would display stylistic consistency throughout some other range of problem situations.

The present analyses did show a number of relations between several self-regulatory scores and variables derived from the maternal interview, and between these scores and personal-social behaviors in the classroom for girls. There were few relations to personal-social behaviors for boys. This overall configuration of results follows closely the patterning of relations between general cognitive ability level and the interview and personal-social indices. Moreover, the several self-regulatory scores showed a tendency to correlate with these indices to the degree that the former contained a component of general ability. MFF Errors had the largest number of significant relations with measures from other domains, MIT Slow had somewhat fewer, and MFF Latencies still fewer, with most of the latter concentrated in the Year 3 data, which was the first year in which MFF Latencies shared a significant amount of variance with general ability. Further, the number of significant relations obtained in all cases dropped drastically when an index of general ability was partialled out of the correlations between self-regulation and measures from other domains. These considerations suggest strongly that, during the first three years, there is little relation between self-regulation and either interview or personal-social measures other than that depending on their mutual relations with general ability indices.

Removing general ability variance from the correlations left essentially no significant relations and no pattern of relations between self-regulatory

behaviors and the interview variables. In the personal-social observations, however, there were two sets of relations which continued to show consistency in patterning, though with coefficients reduced in magnitude. First, the 10 circumplex constructs and MFF Errors continued to show a pattern in which a higher level of self-regulation was associated with higher ratings for Assertive, Sociable, and Loving, and with a lower incidence of Submissive and Withdrawn behaviors. Second, the various self-regulatory behaviors tended to be associated with higher ratings on Cognitive Activity. The matrices of partial correlations were similar for the two sexes, though in the relations with circumplex variables the zero-order correlations had shown significant relations only for females, reflecting the greater proportion of variance shared with general ability measures in the personal-social domain for females than for males.

Emmerich (1973c) has also reported on relations between personal-social constructs and ability and latency measures. Some of his findings will be summarized here to permit comparison with the present results. It should be noted, however, that there are a number of differences between the two studies. Emmerich's sample included children from St. Louis, while the present analyses were restricted to those from the Portland and Trenton sites. His dependent measures were based on one fall and one spring observation for each child to permit a search for relations between change in personal-social behaviors and the independent variables. The average of two fall observations was employed here. Most important, his latency measure was the Year 1 Sigel latency and his ability measures were Year 1 Preschool Inventory and PPVT scores, while the present study focused on MFF performance and employed Year 2 Preschool Inventory as the general ability index.

Three of Emmerich's findings are relevant to a comparison with the present results. First, higher Preschool Inventory scores, and to a large extent higher PPVT scores, were associated with higher ratings on the circumplex constructs Assertive, Sociable, and Loving, and with lower ratings on Submissive, Withdrawn, and Distrusting. Second, Cognitive Activity and Autonomous Achievement were positively associated with general ability as measured by the PPVT; nonsignificant relations in the same direction were found when the Preschool Inventory served as the ability index. Third, along with several curvilinear relations, longer Sigel latencies were associated with higher ratings on Loving and lower ratings on Defiant-Hostile, and in addition with higher ratings on Cognitive Activity, Child Orientation, and Fantasy Activity (the latter a correlate of Child Orientation).

The relations Emmerich found between general ability and the circumplex constructs match closely those obtained in the present data between self-regulatory scores and the circumplex. There is very good agreement between the two sets of analyses as to which circumplex variables are involved in the relation. A difference arises only with respect to whether self-regulatory variance or general ability variance is responsible for the association. It is clear from the partial correlational analyses that most of the variance in the relation is overlap variance. It is also possible that the remaining consistency of pattern in the present data, when general ability is partialled out of the relation, is a statistical artifact. The partial correlation technique is an imperfect procedure for removing from a relation between two variables the variance they both share with a third variable, whenever there is not error-free measurement of this third variable (Lord, 1963; Linn & Werts, 1973). The Preschool Inventory is highly reliable,

but does not provide errorless measurement of the child's cognitive ability at the time of testing; and the use of the Preschool Inventory score from a single year as the covariate introduces further imprecision, to the degree that systematic changes in cognitive ability occur over time. The error introduced is undoubtedly small, but the patterns of relations under discussion also depend on very small amounts of variance represented in the partial correlations between self-regulation and circumplex constructs. There is apparently no statistical procedure which is undisputedly valid for resolving this question (Linn & Werts, 1973). Therefore, further study contrasting the antecedents and correlates of self-regulatory and general ability measures will be required before it can be determined whether any specifically self-regulatory variance is shared with the personal-social circumplex constructs.

A similar argument could be raised in considering the relations between Cognitive Activity and self-regulation reported in this study, and those between Cognitive Activity and general ability reported by Emmerich. Here, however, the coefficients show little reduction when a general ability index is partialled out of the relations. Thus, a more confident conclusion can be made that both general ability--or that component of it which is measured better by the PPVT than by the Preschool Inventory--and self-regulatory ability have positive relations to the child's tendency to engage in Cognitive Activity in the classroom.

There is less obvious parallel in the present data to most of the relations Emmerich reported between Sigel latencies and personal-social constructs. MFF latencies had no significant relations with the circumplex constructs, and showed the same patterning of relations to these constructs

as did MFF Errors. Year 1 Sigel latencies appear to be associated with the Warmth dimension in the circumplex space, whereas self-regulatory ability was more closely associated with the Extraversion-Introversion dimension. Emmerich did find longer Sigel latencies to predict higher ratings on Cognitive Activity, Child Orientation, and Fantasy Activity. Here there is some similarity, in that the various self-regulatory scores correlated in the same direction with Cognitive Activity, and in females tended to be associated with ratings indicating either an orientation toward children or the lack of an orientation toward adults. The relations in the present data, however, were few, weak and scattered across years and self-regulatory scores; they give little basis for a confident conclusion of either similarity or dissimilarity of correlates for the two latency measures.[1]

It is also of interest that Emmerich detected an interaction involving Sigel latency, general ability, and time of measurement. Changes in ratings on Assertive and Withdrawn from the fall to the spring observation differed as a function of the child's Year 1 performance on both the Sigel and Preschool Inventory measures. The present data were confined to measurement in the fall, and so offer no basis for comparison with this finding. They do, however, suggest the possibility that changes over time in personal-social behaviors should be examined for potential relations to the scores considered in the present analyses.

The final set of results requiring comment are those concerned with preschool attendance effects on the level and rate of integration of the self-regulatory behaviors. In general, no effects were detectable. There

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[1] Emmerich (personal communication) has completed a series of analyses in which much more direct comparisons of Year 1 Sigel latencies and Year 1 MFF latencies can be made. The overall result was one of dissimilarity in the relations, with more significant relations for the Sigel measure.

were a few indications of a difference in rate of development associated with testing site, with children in Lee County possibly lagging behind those in Trenton and Portland; but there was no basis for inferring a relation between this difference and the provision of preschool experience in the second vs. the third year of the study. There was also suggestive evidence that in the Trenton-Portland sample, those children who were economically eligible for Head Start but did not attend any preschool program, lagged behind the remaining subgroups in their self-regulatory development. Again, however, no statistical support was provided for attributing this lag to the lack of preschool attendance.

The analyses of preschool attendance effects could, however, be refined in a number of respects. Aside from those problems in the measurement of self-regulation which have been detailed in this discussion, the major inadequacy in these analyses concerns the lack of provision for differential preschool effects associated with program differences, child differences, or their interaction. Moreover, the repeated measures analysis of variance that was used controls for initial child differences in level of performance on the dependent variable, self-regulation. However, the assumption underlying this control--that the meaning of the self-regulatory scores is invariant over time, so that a child's initial level is an appropriate baseline against which to assess his development--is inconsistent with conclusions drawn from both this and the earlier self-regulation report. These analyses, therefore, can be considered only preliminary, and should be redone when the necessary preparation for a more refined assessment of preschool attendance effects has been completed.

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